

CHAPTER 11

Wildfire Hazards: Risks and Mitigation

11.1 Identifying and Profiling Wildfire Hazards

11.2 Assessment of Local Wildfire Vulnerability and Potential Losses

11.3 Assessment of State Wildfire Vulnerability and Potential Losses

11.4 Mitigation Efforts for Wildfire Hazard Mitigation

11.1 Identifying and Profiling Wildfire Hazards

According to the USFS, each year an average of more than 73,000 wildfires burn about 7 million acres of federal, tribal, state and private land and more than 2,600 structures in the United States.¹ Firefighters suppress 95% of Utah wildfires on initial attack, but adverse weather and topography, heavy fuel loads and urban development all combine to create catastrophic wildfire conditions in the state. A wildfire is an uncontrolled fire spreading through vegetative fuel often consuming structures and wildlife in its path. Wildland fires often begin unnoticed, spread quickly, and are usually sighted by dense smoke. Scientists estimate that before the colonization of North America, wildfires burned 10 times the land that is consumed today.² They help to maintain a healthy ecosystem and have been a natural and fundamental part of the world's forests and grasslands for millions of years. Fires cleanse and regenerate forests, giving new life to the soil and encouraging biodiversity. They are responsible for the evolution of many of the grasses, brushes, and tree species found in Utah.

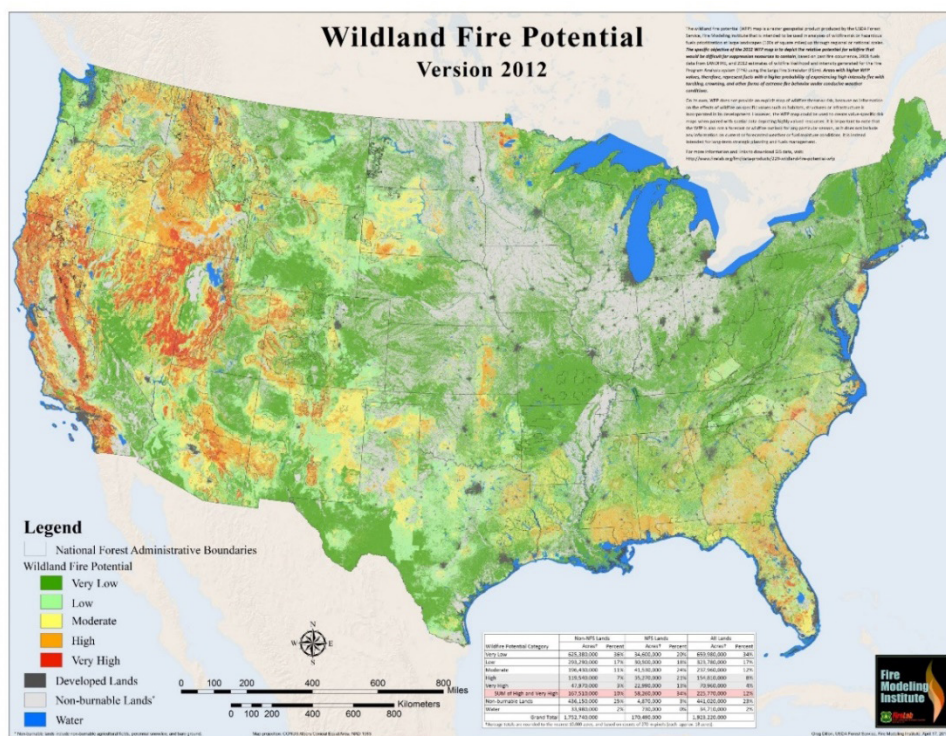
Wildfires are classified as Wildland and Wildland-Urban Interface (WUI). Wildland fires occur in areas where development is essentially nonexistent except for roads, railroads, or power lines. WUI fires materialize in a geographical area where structures and other human development adjoins wildlands. A fireshed is an area that will adversely affect a community or high-value resource and/or asset if ignited.

WUI areas are divided into four subclasses:

- Occluded interface are wildland parks or open spaces typically less than 1,000 acres in size located in urban areas surrounded by structures.
- Mixed or Intermixed interface contain structures scattered throughout a rural areas of 40 acres covered predominately by native, flammable vegetation.
- Classic interface is where homes border wildland vegetation along a broad front with a development density of three or more structures per acre.
- Rural interface small clusters of structures like ranches, farms, resorts, or cabins located in wildland areas miles from the next development.

The western United States has some of the highest wildland fire potential in the country. Utah is one of the most wildfire prone states in the United States and naturally occurring wildfires burning 500 acres or more over the past 25 years closely follow the risk potential map below.

Map 1. Wildland Fire Risk Potential



Source Greg Dillon, USDA Forest Service, Fire Modeling Institute, 2013

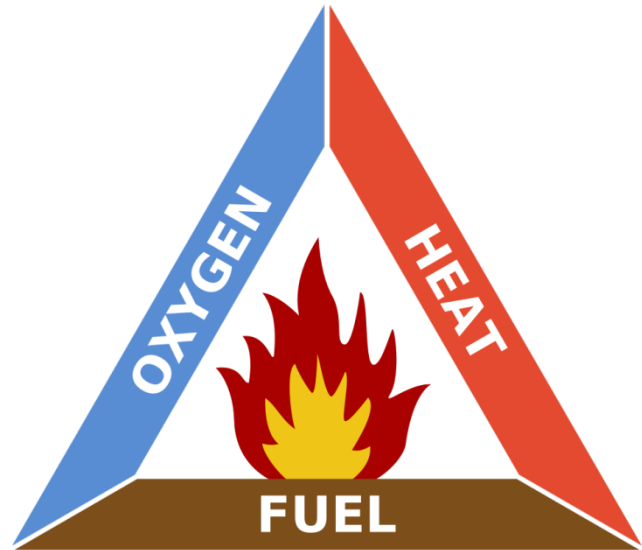
1 <https://www.fs.fed.us/managing-land/fire>

2 <https://www.nps.gov/fire/wildland-fire/learning-center/fireside-chats/history-timeline.cfm>

Three basic elements are needed for a fire to occur (1) a heat source (2) oxygen, and (3) fuel. Ignition sources for wildfires can be natural, accidental or incendiary. A review of two decades of government agency wildfire records between 1992 and 2012 shows the length of the fire season across the west increased by nearly six weeks in that 20 year span. Mega fires defined as a wildfire burning more than 100,000 acres have increased threefold in the last ten years and the number of fires exceeding \$10 million to extinguish has risen every year for the past decade with 25 to 30 occurring annually in the US. The data indicates that 84% of US wildfires are human caused and these man-made fires destroy an area seven times greater than fires caused by lightning.³

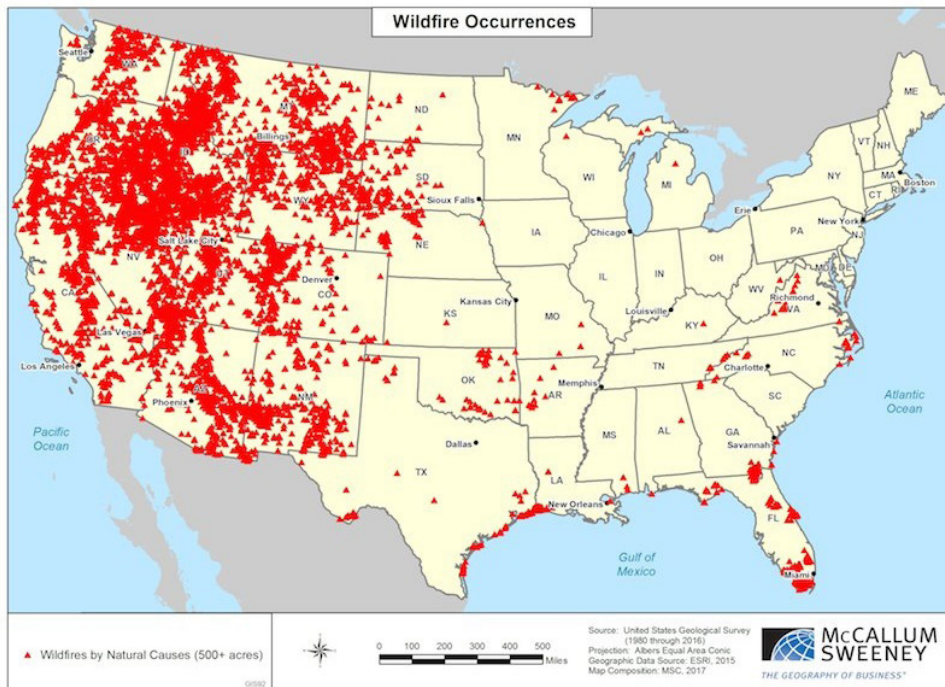
According to the FFSL, in Utah 75% of all wildfires are extinguished before they exceed 10 acres and 50% of all fires in Utah are preventable, human-caused events. Once a wildfire starts, vegetation, topography and weather are all contributing factors in rate of spread of the fire's growth.

Figure 1: The Fire Triangle



Source: Wikipedia, The Fire Triangle, Own work, User: Gustavb

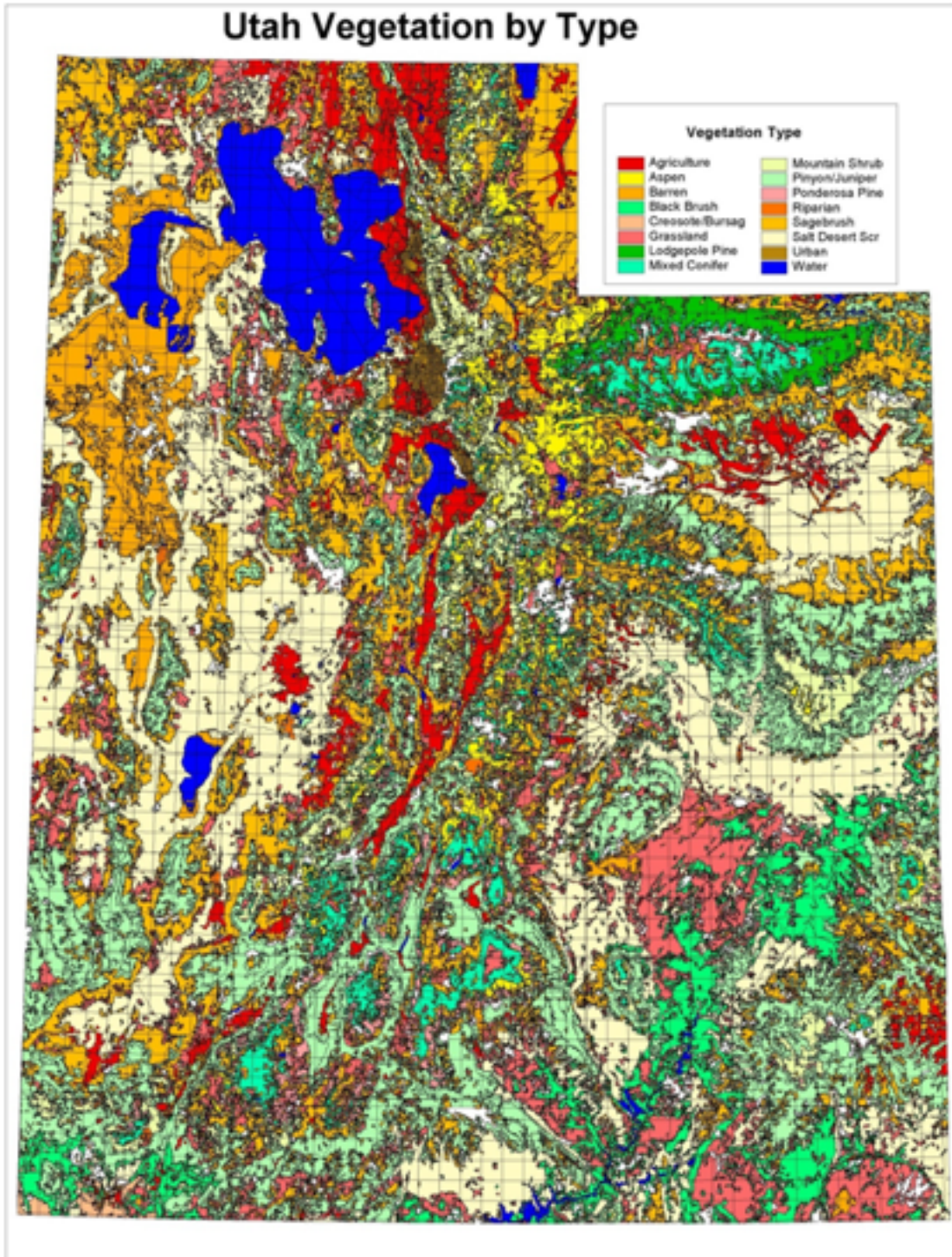
Map 2. U.S. Natural-Caused Wildland Fires 500 Acres+ 1980 to 2016



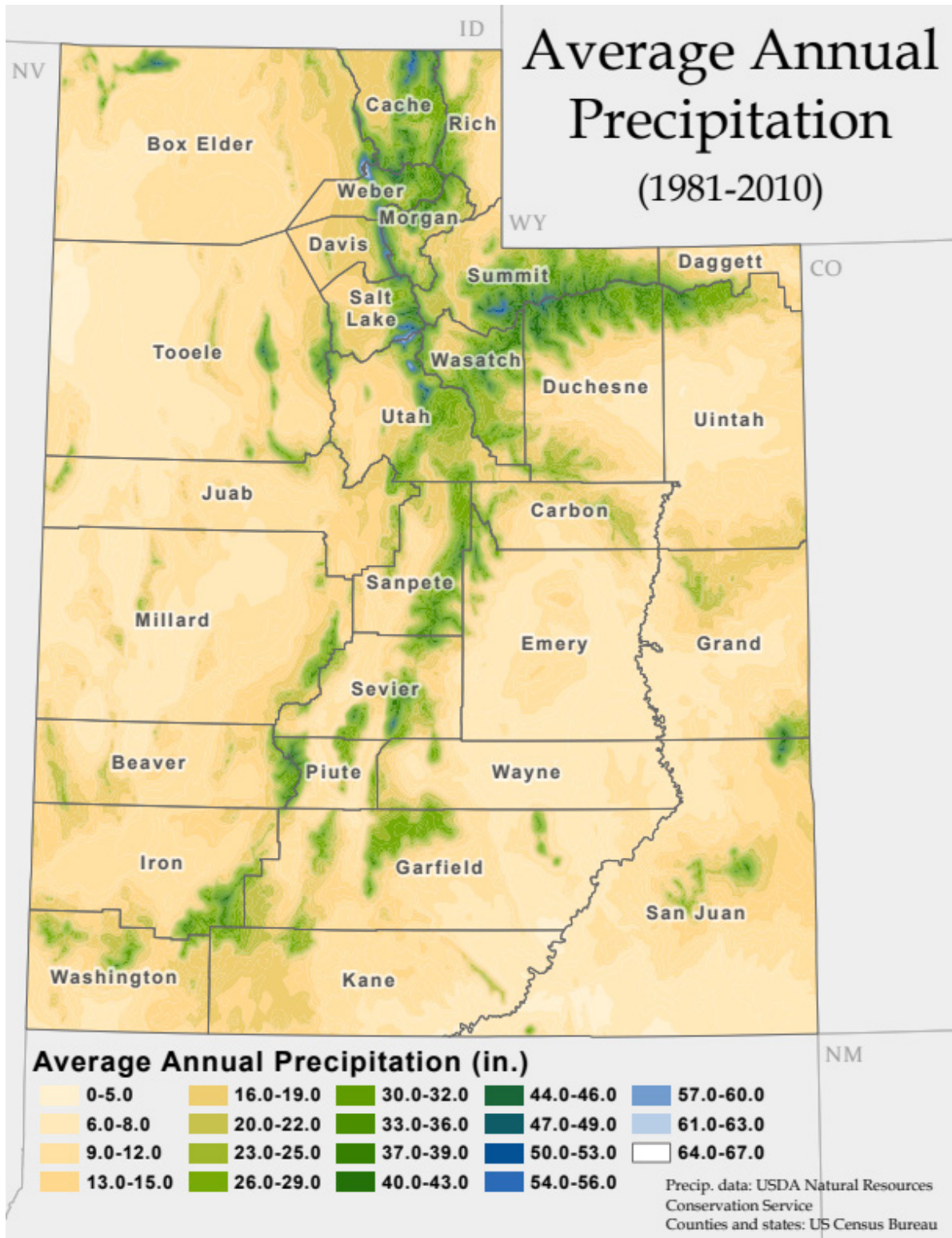
Utah's wildfire risk potential changes from year to year. The variables include vegetation fuel sources, snow totals, precipitation, ground moisture saturation and temperature. The state's latest snapshot of wildland fire risk in Utah quantifies risk by county, per capita and by community.

On average in Utah, years with more spring rainfall typically have higher wildfire incidents in the summer and fall after vegetation dries out and becomes combustible material. Hot temperatures, high winds, and dry conditions brought on by years of drought have caused high mortality rates in low elevation timber and shrubs, all contributing to prime fire conditions.

Map 3. Utah Vegetation by Type



Map 4. Average Annual Precipitation



WILDFIRE EFFECTS ON INFRASTRUCTURE

Wildfires can also cause substantial damage to communications, electrical, water delivery systems and transportation infrastructure.

Communications infrastructure (e.g. internet, phone, television, radio) including emergency notifications can be interrupted if cell phone towers are damaged in wildfire incidents. This may impede evacuation notices if mobile phones and radio and television broadcasts are hindered. Damaged radio relay towers can also impact emergency responders' ability to communicate effectively.

The destruction of energy infrastructure like power lines can impact medical services and equipment to homes and hospitals if redundancies like generators aren't in place and adequately fueled until power can be restored. Downed powerlines can also impede evacuations and first responders' ability to access certain locations in an emergency. The expedient repair and replacement of electrical infrastructure is critical to disaster recovery following an incident.

Water delivery systems can also be affected by wildfires if increased sediment decreases storage capacity in Utah dams and reservoirs.

Transportation infrastructure (e.g. roads, bridges, rail) are essential to respond to an emergency or disaster. Wildfires often require major road closures. This impedes first responders, evacuations and the transportation of goods and supplies, especially if detours are limited. Wildfire damage to railroad lines impairs commerce with devastating financial consequences to companies that depend on rail transportation.

WILDFIRE EFFECTS ON THE NATURAL ENVIRONMENT

Intensifying wildfire severity is blamed on a century of fire exclusion where fire suppression, elimination of Native American ignitions and overgrazing has modified healthy low-intensity surface fires that have become dangerous high-intensity and severe crown fires.

There are three types of wildfires common in Utah:

Ground Fires - sometimes called subsurface fires they are typically started by lightning and burn organic matter in the soil beneath the surface of the forest floor sustained by combustion. In Utah, more than 800 lightning strikes are recorded annually.

Surface Fires - are the most common wildfire slowly burning organic fuels on the forest floor damaging or killing trees in the fire's path.

Crown or Canopy Fires - are the most intense and difficult fire to contain. Spread by strong winds, steep slopes, and a heavy fuel load of dense trees they burn across the foliage or top layer of the forest.

Population growth in fire-prone areas has resulted in increased accidental and intentional ignitions that are changing the native vegetation to more fire resistant plants and grasses. Wildfires also impact the state's timberlands and woodlands which affect many animal species leading to habitat loss, displacement and death. Fires also destroy Utah's recreation and open spaces and increase downstream sedimentation. Grasslands and shrublands can regrow within a decade of a wildfire but mature forests take considerably longer. Post-fire land subjected to severe rainstorms prior to vegetation recovery is at high risk for mudslides and erosion. Mudslides present a threat to human life and property in populated areas. Increased sediment deposits impact fish habitats increasing turbidity making it more difficult for fish to find food in wider or shallower channels, damaging their gills and changing water chemistry. Concentrations of phosphorous and nitrogen from burned vegetation delivered to streams through surface runoff increases water temperature, which is also detrimental to most cold-water fish species.



Ground fire, Grand Canyon National Park, Arizona (NPS)



Surface fire, Grand Canyon National Park, Arizona (NPS)

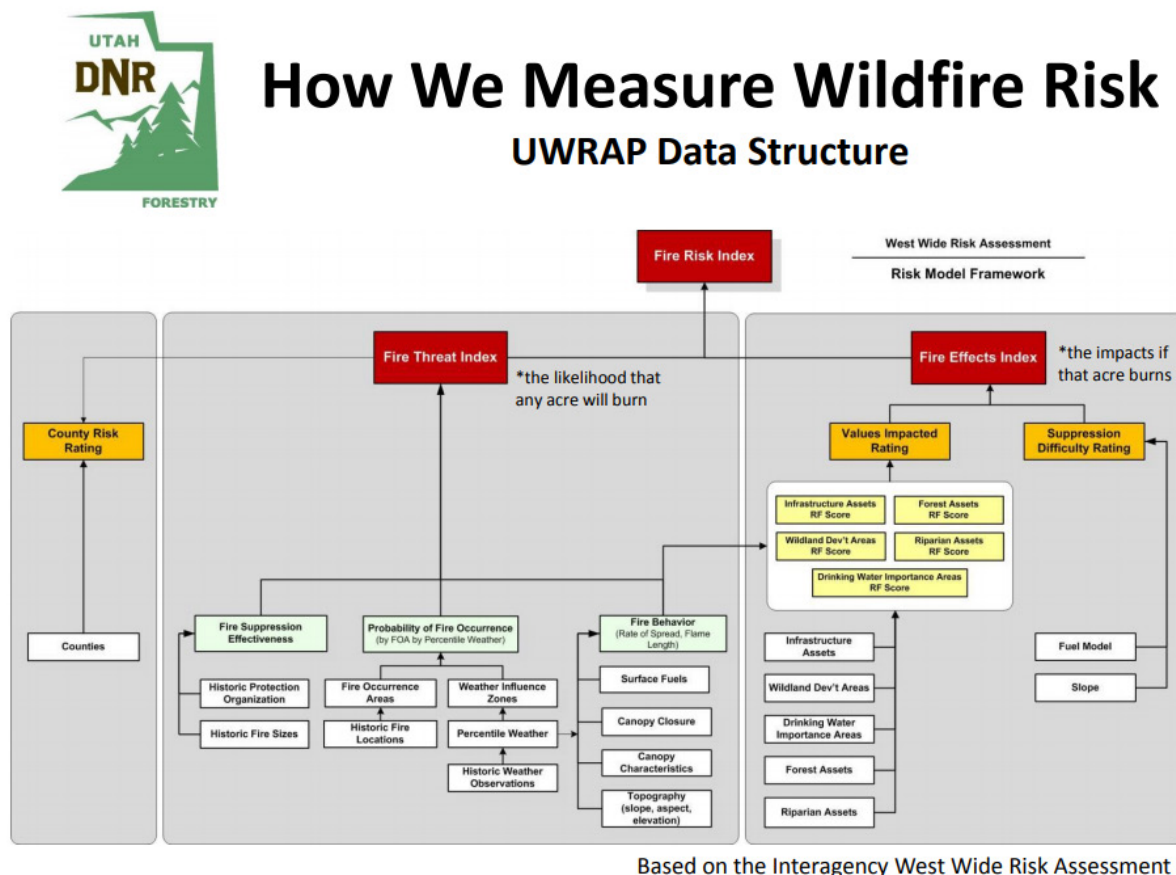


Canopy fire, Yellowstone National Park, Wyoming (NPS)

WILDFIRE RISK

In 2016, the Utah Division of Forestry Fire and State Lands developed the Utah Wildfire Risk Assessment Portal (UWRAP), which provides a comprehensive, scientifically based decision support tool to assist wildfire and land managers in reducing the risk of wildfire in our state. Figure 2 illustrates how the data structure of the UWRAP tool is organized.

Figure 2. UWRAP Data Structure

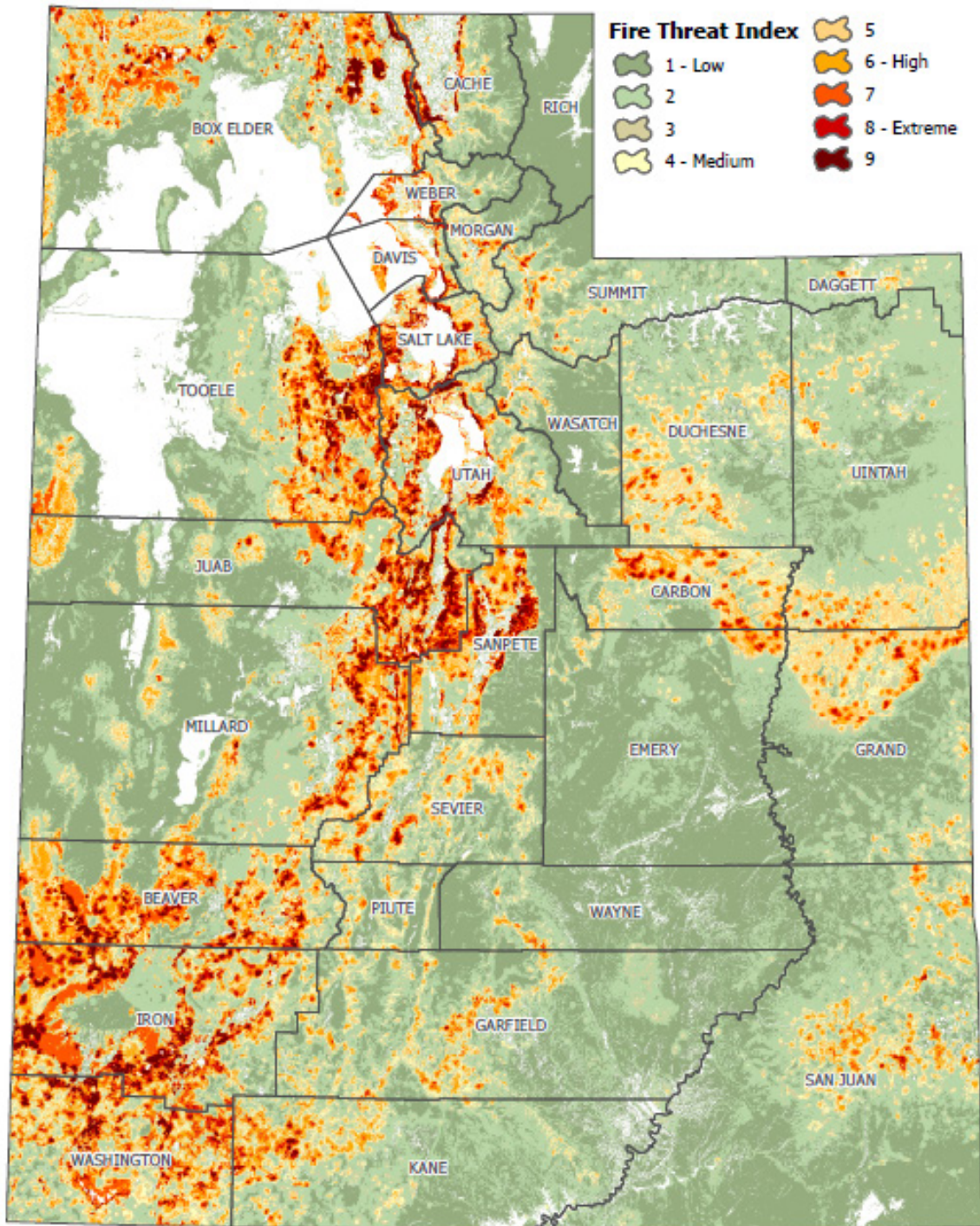


Based on the Interagency West Wide Risk Assessment

Source: Utah Division of Forestry, Fire, and State Lands, 2017

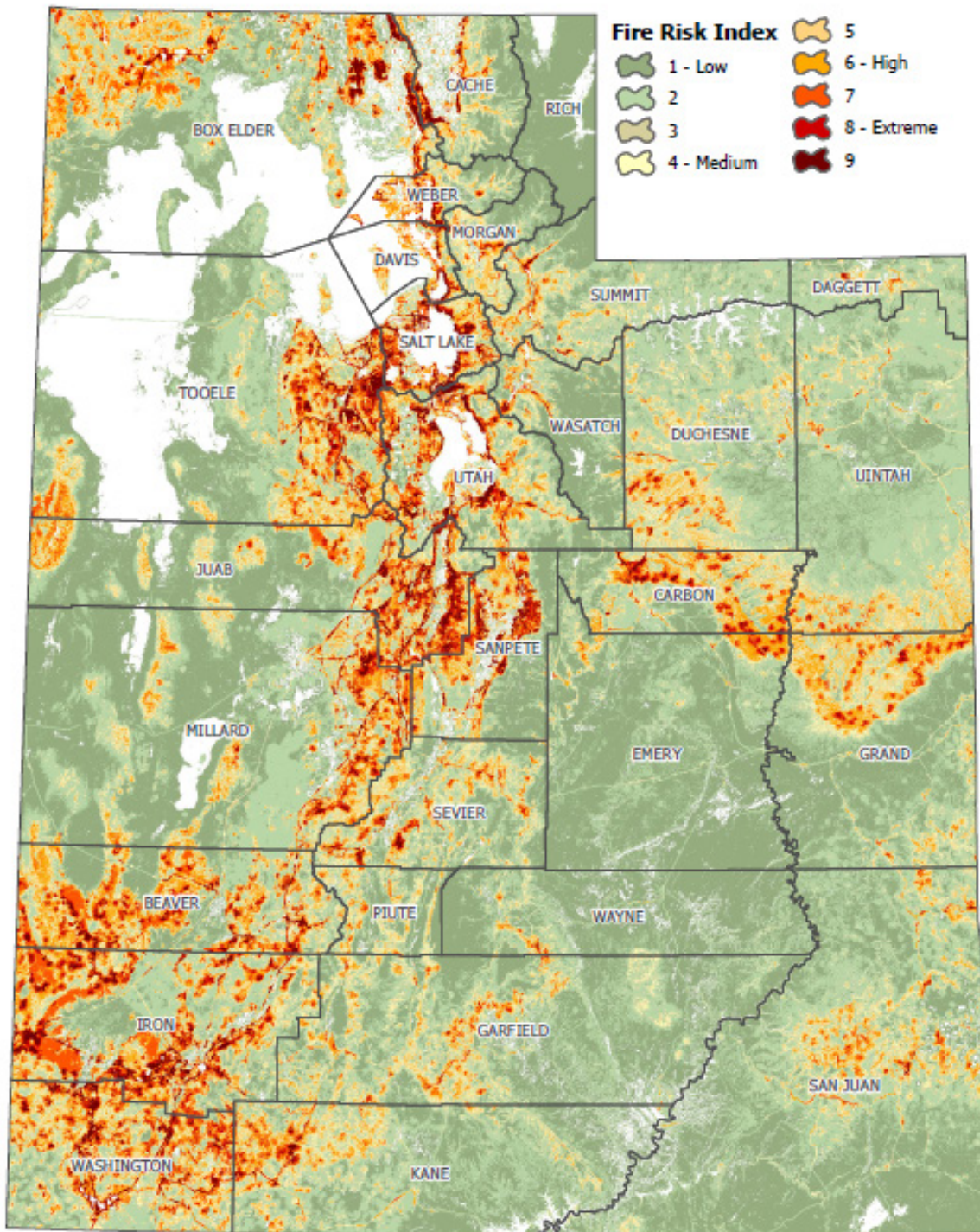
The Fire Risk Index is a measure of overall wildfire risk. It is calculated by multiplying the Fire Threat Index (FTI), which estimates the likelihood of an acre to burn, and the Fire Effects Index (FEI) that identifies areas with important assets where wildfires are costly to suppress and the economic impacts of that acre burning.

Map 5. Utah Wildfire Threat Index



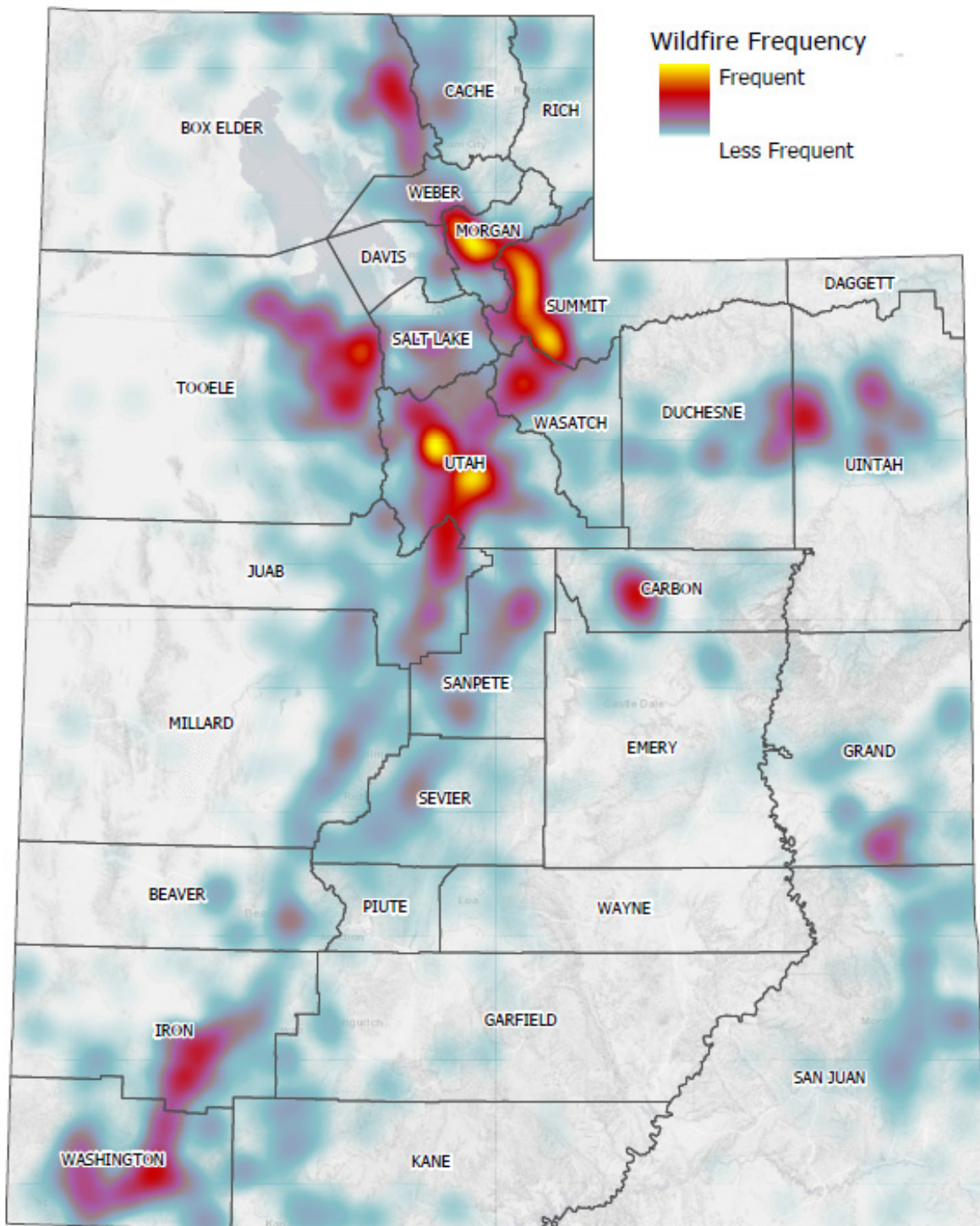
Source: UWRAP, Utah Division of Forestry, Fire, and State Lands, 2017

Map 6. Utah Wildfire Risk Index



Source: UWRAP, Utah Division of Forestry, Fire, and State Lands, 2017

Map 7. Human-Caused Wildfires 2005 – 2016



Map 8. Significant Wildfires (5,000+acres) 1984 – 2016

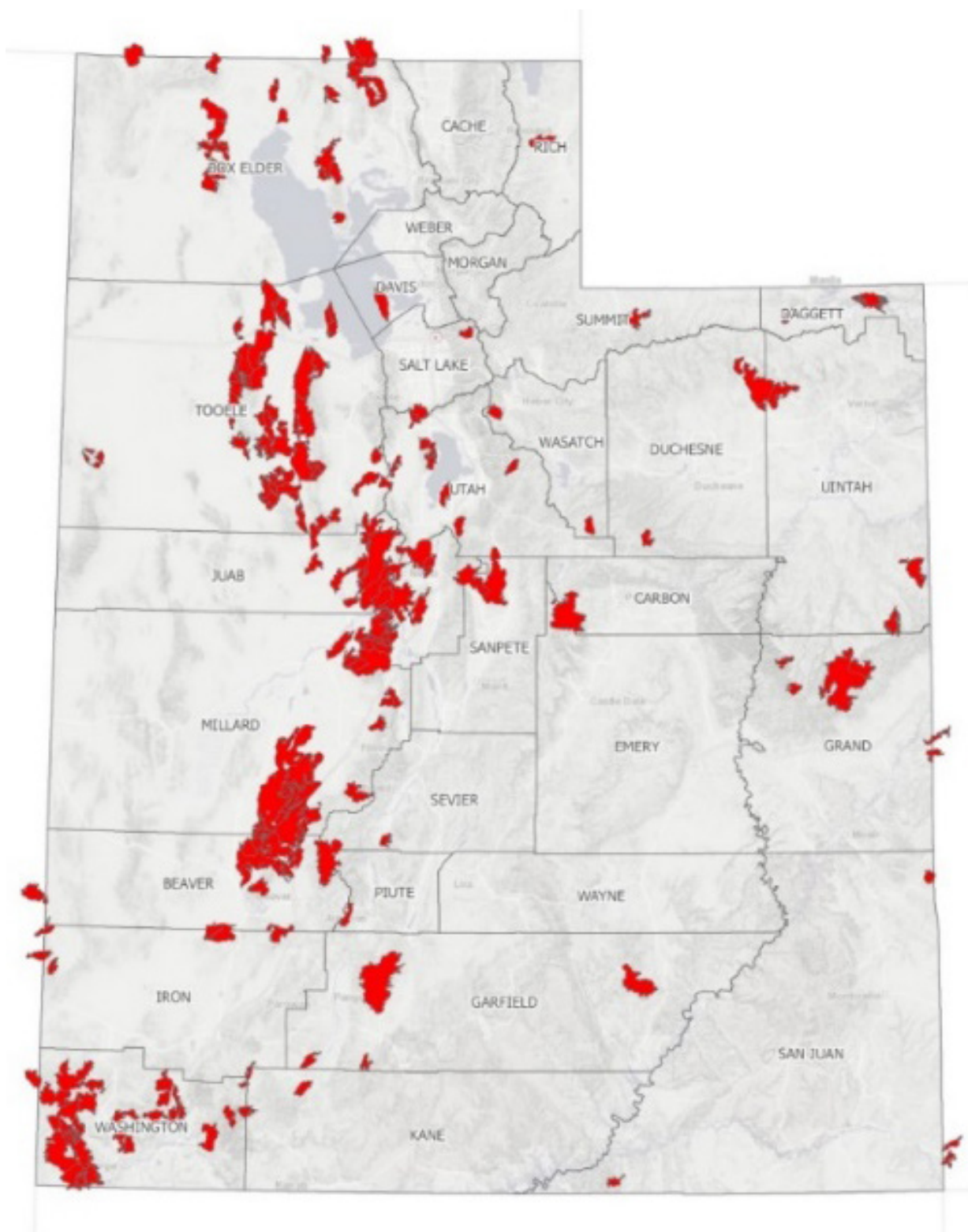


Figure 3. Utah Wildfire Acres Burned 1985 - 2015

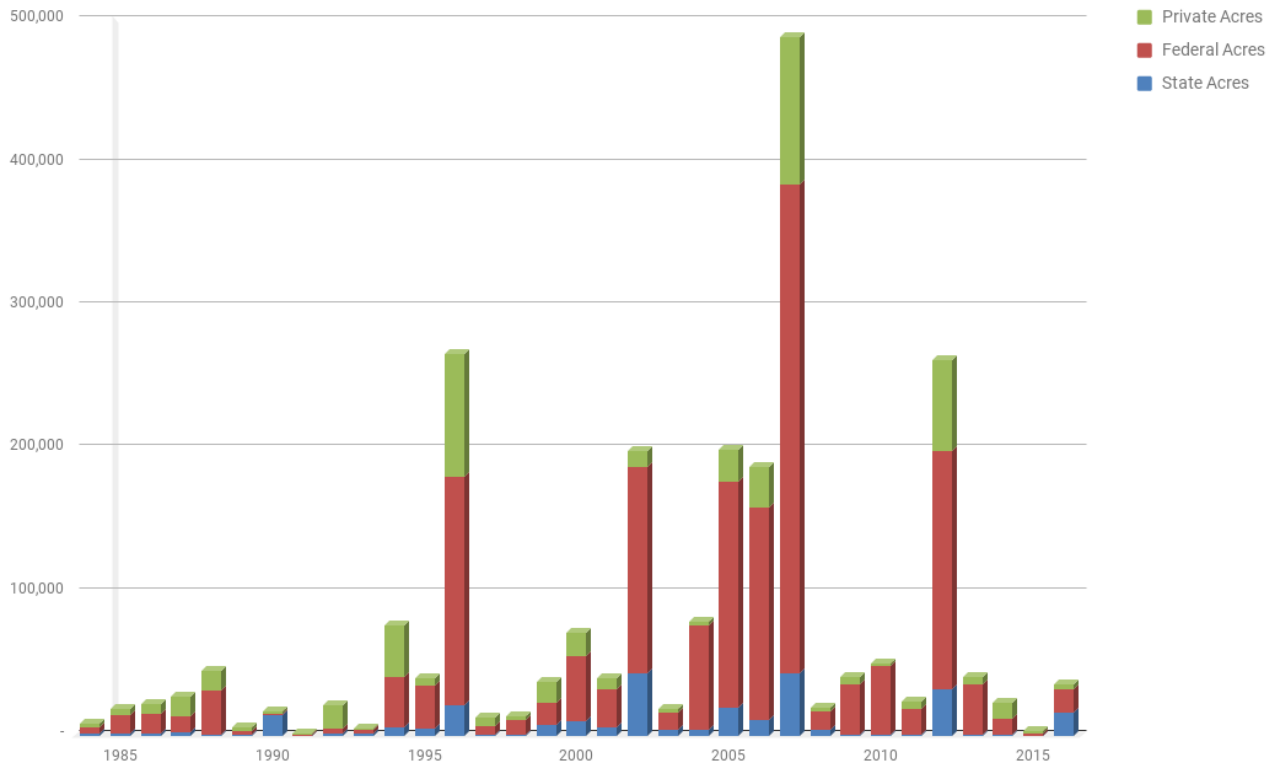
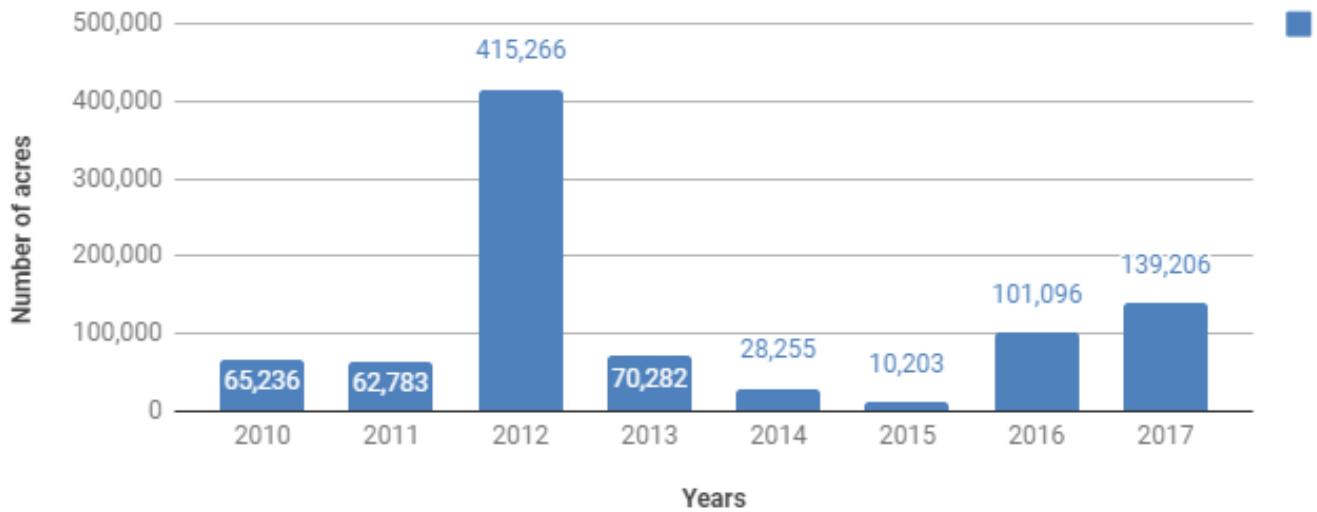


Figure 4. Utah Wildfire Incidents 2010 – 2017



In Utah an upward trend in fire size over the past 50 years is evident. Wildfire statistics from 2003 to 2017 reveal wildfire seasons fluctuate from year to year and a high wildfire season one year does not predict the following year.

Figure 5. Utah Number of Acres Burned Annually 1960 - 2012

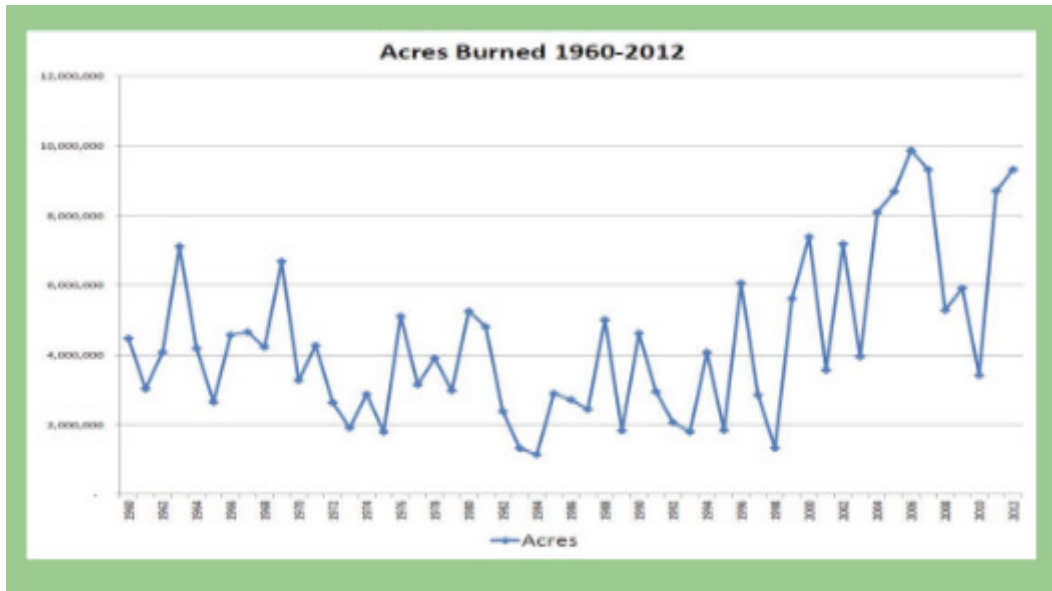
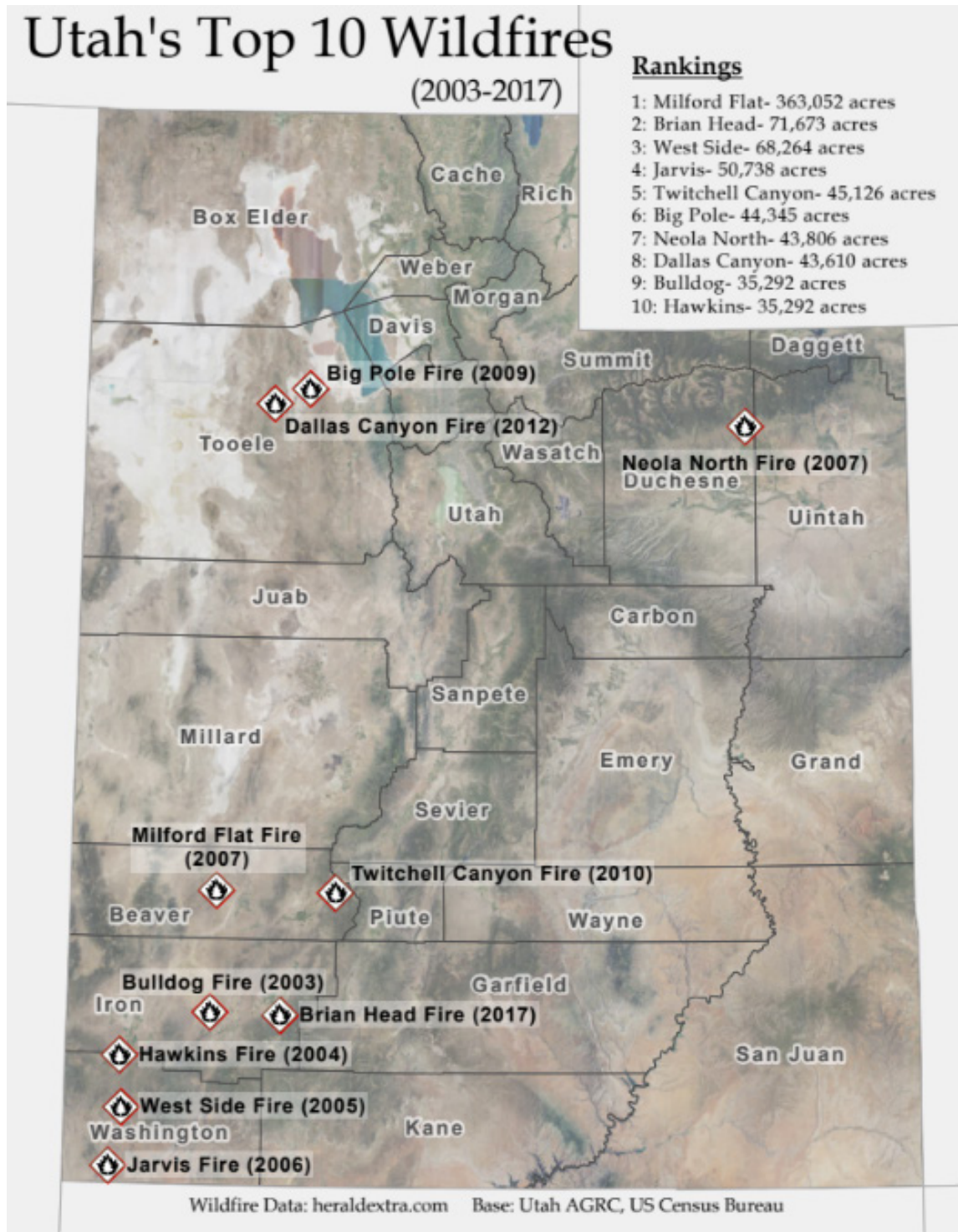


Table 1. Utah's 10 Largest Wildfires 2005 - 2018

Rank	Year	Fire Name	Location	Acres Burned
1	2007	Milford Flat Fire	Near Milford	363,052
2	2018	Pole Creek Fire	12 miles NE of Nephi	102,190
3	2017	Brian Head Fire	Near Brian Head	71,673
4	2018	Dollar Ridge Fire	8 miles SW of Duchesne	68,869
5	2005	West Side Fire	20 miles NW of St. George	68,264
6	2006	Jarvis Fire	10 miles SW of St. George	50,738
7	2010	Twitchell Canyon Fire	7 miles E of Manderfield	45,126
8	2009	Big Pole Fire	Skull Valley near Grantsville	44,345
9	2007	Neola North Fire	N of Neola	43,806
10	2012	Dallas Canyon Fire	10 miles SW of Delle	43,610

Map 9. Utah's 10 Largest Wildfires 2003 – 2017



(Map 9 does not include the large fires that occurred in 2018.)

There have been 22 fire-related deaths in Utah since 1950.

Table 2. Utah Fire Fatalities 1950 - 2017

Year	Fire Name	Deaths	Location
1950	Dinosaur National Monument Fire	1	Uintah County
1961	Firefighting Aircraft Accident	1	Not Stated
1975	Stockton Fire	2	Tooele County
1977	Ashley National Forest Fire	3	Daggett County
1990	Midway Fire in Wasatch Mountain State Park	2	Wasatch County
1996	Bryce Canyon Fire	1	Garfield County
1996	Fruitland Fire	1	Duchesne County
2000	North Stansbury Fire	2	Tooele County
2004	Dammeron Fire	1	Washington County
2006	Devil's Den Fire	1	Millard County
2007	Neola North Fire	3	Uintah County
2009	Four Mile Fire	3	Oquirrh mountains
2017	Brian Head Fire	1	Iron County

Source: https://www.nifc.gov/safety/safety_documents/Fatalities-by-Year.pdf

Figure 6. Utah Number of Wildfires 2002 – 2017

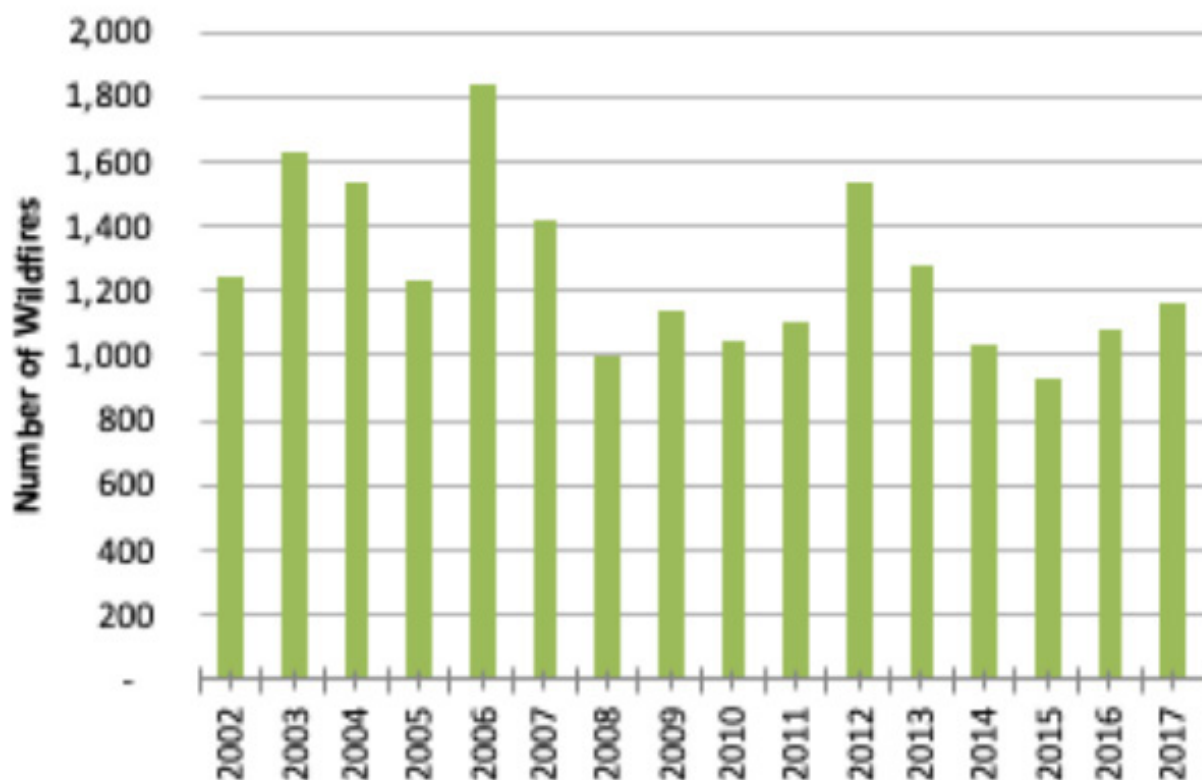


Figure 7. Utah Acres Burned from Wildfires 2002 - 2017

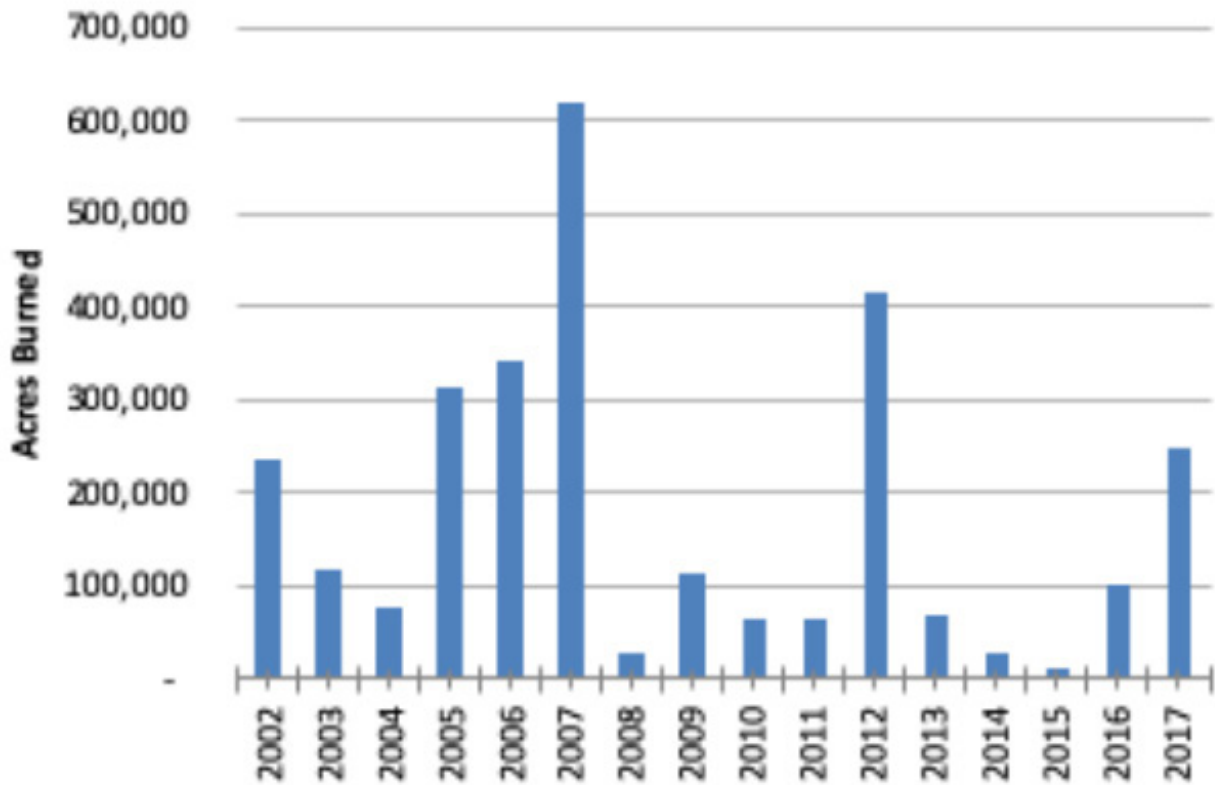
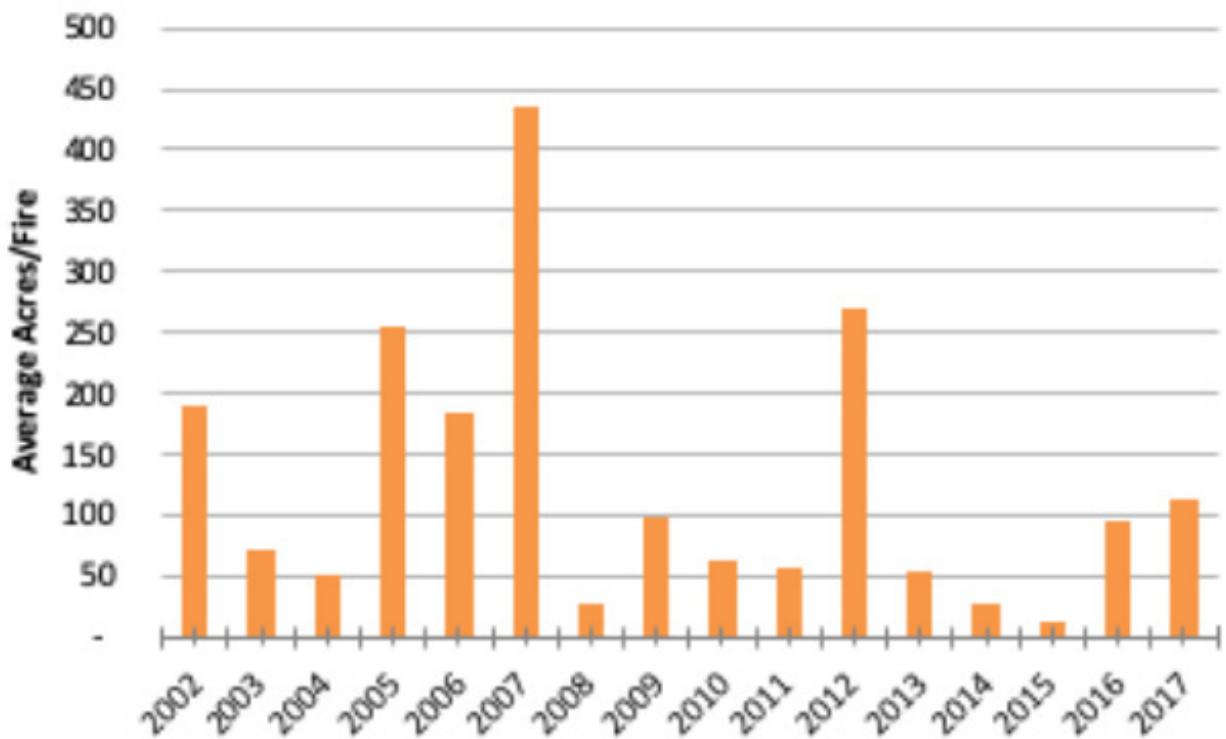


Figure 8. Utah Average Acres Burned per Fire 2002 - 2017



NEOLA NORTH FIRE

In 2006, Utah experienced 1,843 wildfires with 13 burning more than 5,000 acres. In 2007, 1,385 wildfires burned nearly 650,000 acres including the largest wildfire to date in Utah's recent recorded history at Milford Flat which destroyed 363,052 acres. That same year the Neola North fire resulted in three fatalities. Local resources were exhausted, so firefighters from neighboring states provided assistance.

When the 2007 fire season was over, Utah's Division of Air Quality reported 40 days of unhealthy air, 24 days more than the previous year and in Millard County dust storms created hazardous driving conditions on I-15 for months. Burn bans implemented due to air pollution and poor air quality impact the FFSL's ability to do prescribed wildland maintenance burns in Utah.



Source AP Photo Douglas C. Pizac

Many of Utah's large wildfires are allowed to burn themselves out because they occur in unpopulated areas, do not threaten structures and the cost to extinguish them is cost-prohibitive. These wildfires do not qualify for federal disaster status because they occur in regions where they do not affect people or the built environment.

There have been 21 Fire Management Assistance Declarations in Utah since 2003. The 2012 wildfire season burned 415,266 acres at a cost of over \$50 million and led to 5 Fire Management Assistance Grants (FMAG). 2007 and 2018 both had three FMAG declarations each. See Table 3.

Table 3. FMAG Declarations in Utah 2003 - 2018

FM #	Fire Name	Incident Period	Declaration Date
2480	Causey Fire	July 14 to July 28, 2003	July 15, 2003
2521	Brookside Fire	June 16, 2004	June 16, 2004
2564	Blue Springs Fire	June 27 to July 01, 2005	June 27, 2005
2703	Neola Morris Fire	June 30 to July 05, 2007	June 30, 2007
2707	Milford Flats Fire	July 06 to July 17, 2007	July 7, 2007
2715	Salt Creek Fire	July 21 to August 05, 2007	July 21, 2007
2831	Mill Flat Fire	July 25, 2009	August 30, 2009
2859	Machine Gun Fire	September 19, 2010	September 19, 2010
2983	Dump Fire	June 22 to June 24, 2012	June 22, 2012
2986	Wood Hollow Fire	June 24 to June 28, 2012	June 24, 2012
2990	Clay Springs Fire	June 27 to July 07, 2012	June 27, 2012
2991	Rose Crest Fire	June 29 to June 30, 2012	June 29, 2012
2994	Shingle Fire	July 02 to July 09, 2012	July 2, 2012
5044	Rockport Five Fire	August 13 to August 19, 2013	August 13, 2013

FM #	Fire Name	Incident Period	Declaration Date
5065	Anaconda Fire	July 21 to July 22, 2014	July 21, 2014
5130	Saddle Fire	June 21 to July 12, 2016	June 21, 2016
5185	Brian Head Fire	June 17 to July 11, 2017	June 18, 2017
5206	Uintah Fire	September 05 to September 08, 2017	September 5, 2017
5248	Dollar Ridge Fire	July 02 to July 22, 2018	July 2, 2018
5267	Hilltop Fire	August 06 to August 11, 2018	August 6, 2018
5277	Bald Mountain Fire	September 21 to September 24, 2018	September 21, 2018

In 2012 and 2013 Summit and Millard Counties had large wildfires resulting in FEMA declarations for the Clay Springs and Rockport fires. The largest fire in Utah's recent recorded history, the Milford Flats Fire, burned 363,052 acres in Millard and Beaver Counties.

In 2015, Utah enjoyed a small reprieve when only 10,203 acres burned, but the next year 101,096 acres were ravaged by wildfire at an estimated cost of \$45 million. The two largest fires in 2016 were both ignited by lightning. The West Antelope Fire scorched 13,740 acres, half the Great Salt Lake's Antelope Island and the Briggs Fire consumed 8,883 acres and forced wildlife officials to relocate 140 native Bonneville cutthroat trout from a Beaver County stream to the south fork of North Creek due to increased levels of sediment and therefore water conditions is incompatible for aquatic life.

In 2017, 1,166 wildfires were recorded and 249,829 acres burned in Utah.⁴ The Brian Head Fire was human caused and destroyed 71,673 acres and lightning caused the Onaqui Mountain Complex fire which consumed 37,942 acres.

The numbers suggest a decrease in wildfire suppression costs from 2005 to 2016 but more data is needed to determine if the trend will persist over time. Human caused fires have neither decreased nor increased from 2005 to 2016, suggesting fire prevention education to date has not been effective.

⁴ https://www.nifc.gov/fireInfo/fireInfo_statistics.html

11.2 Assessment of Local Wildfire Vulnerability and Potential Losses

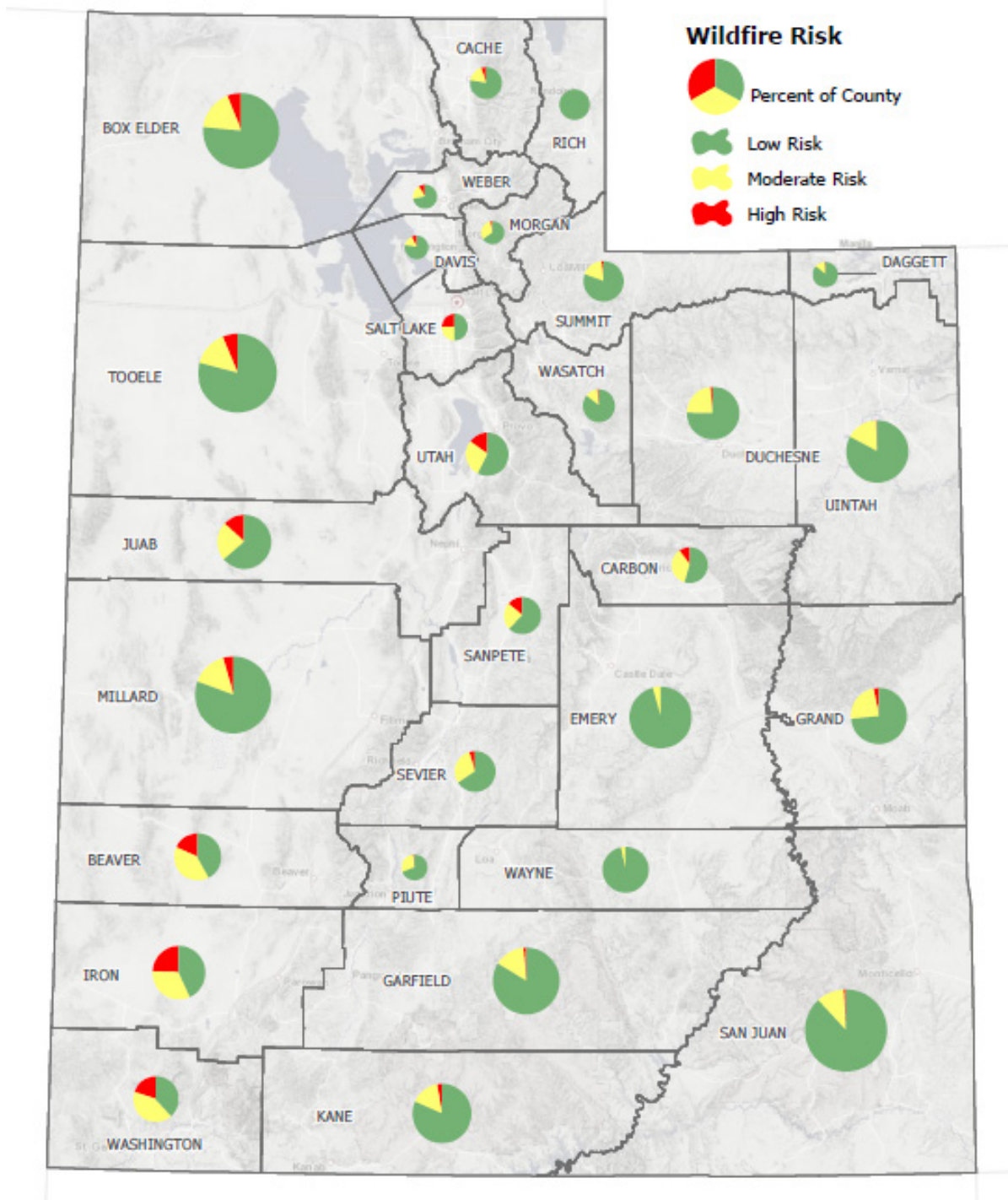
An analysis based on the Utah Wildfire Risk Assessment Portal was performed to show the percentage of each county's threat to wildfire risk. The results show the threat based on a percentage of land that falls under certain threat categories ranging from VVL (Very Very Low) to VVH (Very Very High). There are 7 counties that have 25% or greater of its land being a high threat to wildfire. These include: Beaver, Davis, Iron, Salt Lake, Sanpete, Utah, and Washington counties.

Table 4. County Wildfire Threat 2018

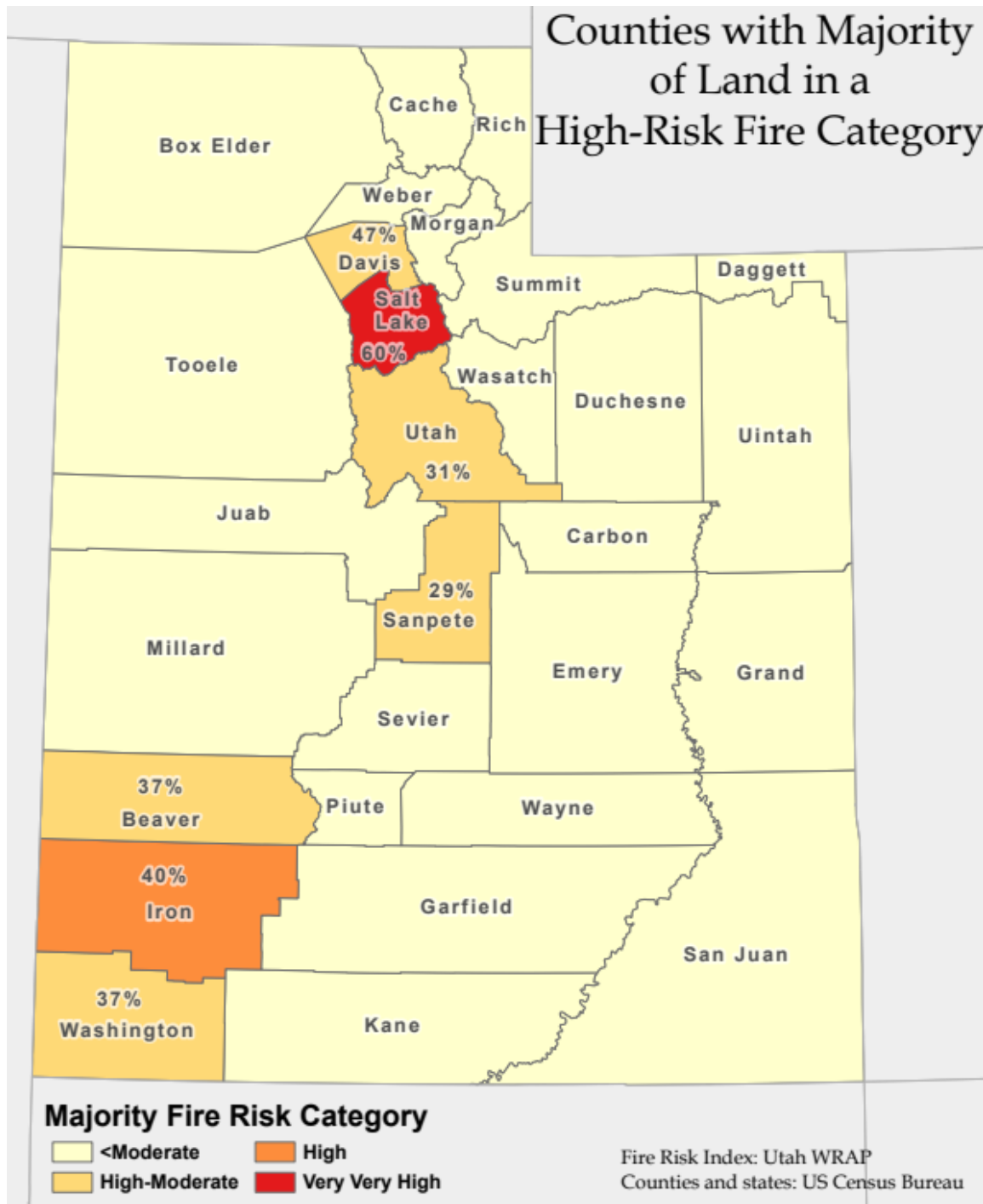
County	VVL%	VL%	L%	LM%	M%	HM%	H%	VH%	VVH%	High Totals
Beaver	15.2%	18.1%	6.5%	9.7%	14.0%	17.4%	11.6%	4.9%	2.5%	36.5%
Box Elder	24.5%	27.3%	6.8%	8.6%	10.3%	11.9%	5.8%	2.4%	2.4%	22.5%
Cache	37.0%	24.9%	7.8%	8.7%	8.1%	5.8%	2.7%	2.0%	3.0%	13.5%
Carbon	17.0%	26.6%	8.1%	10.4%	13.7%	13.5%	5.9%	3.5%	1.3%	24.2%
Daggett	13.8%	59.9%	11.2%	7.5%	4.4%	2.0%	0.7%	0.3%	0.2%	3.2%
Davis	3.6%	10.1%	8.2%	13.6%	17.5%	20.7%	11.4%	6.4%	8.6%	47.0%
Duchesne	11.4%	47.0%	11.8%	11.7%	10.4%	5.3%	1.7%	0.5%	0.1%	7.7%
Emery	69.4%	22.1%	2.4%	1.7%	1.3%	1.9%	0.7%	0.4%	0.1%	3.0%
Garfield	39.0%	33.7%	7.6%	8.4%	6.1%	3.6%	1.2%	0.3%	0.1%	5.2%
Grand	38.4%	26.8%	6.0%	7.6%	9.5%	8.0%	2.5%	1.0%	0.1%	11.6%
Iron	8.9%	23.7%	6.7%	9.0%	11.9%	13.7%	14.5%	6.7%	4.8%	39.8%
Juab	35.6%	19.8%	4.7%	6.8%	9.1%	9.6%	6.7%	4.2%	3.5%	24.0%
Kane	33.2%	37.3%	7.0%	7.3%	6.8%	4.9%	2.2%	0.9%	0.4%	8.4%
Millard	45.6%	27.7%	4.7%	5.6%	6.2%	5.3%	2.8%	1.4%	0.8%	10.3%
Morgan	32.6%	21.6%	8.8%	13.2%	13.5%	6.6%	2.2%	1.0%	0.5%	10.3%
Piute	33.9%	24.0%	8.5%	13.4%	12.6%	5.5%	1.8%	0.3%	0.0%	7.7%
Rich	95.5%	4.1%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Salt Lake	1.2%	8.9%	6.2%	9.5%	14.3%	18.0%	15.3%	11.2%	15.4%	59.8%
San Juan	45.8%	33.7%	6.1%	5.7%	4.5%	2.9%	1.0%	0.2%	0.1%	4.2%
Sanpete	29.8%	19.4%	5.3%	7.0%	9.8%	12.1%	7.5%	5.4%	3.7%	28.7%
Sevier	23.4%	29.1%	9.8%	12.8%	11.9%	7.5%	3.3%	1.6%	0.7%	13.0%
Summit	21.5%	45.7%	11.3%	9.3%	6.5%	3.5%	1.3%	0.6%	0.4%	5.7%
Tooele	28.2%	28.1%	5.8%	8.2%	9.5%	8.8%	5.6%	3.2%	2.7%	20.2%
Uintah	17.6%	56.0%	7.6%	7.1%	7.2%	3.4%	0.9%	0.3%	0.0%	4.6%
Utah	15.3%	22.9%	8.4%	10.5%	12.1%	12.0%	8.5%	4.8%	5.3%	30.7%
Wasatch	57.3%	22.2%	5.1%	5.2%	4.7%	3.2%	1.4%	0.6%	0.3%	5.5%
Washington	3.8%	20.8%	9.3%	12.6%	16.1%	16.0%	10.8%	6.4%	4.2%	37.4%
Wayne	70.5%	21.8%	3.0%	2.2%	1.3%	0.8%	0.3%	0.1%	0.0%	1.2%
Weber	27.2%	20.9%	8.0%	10.1%	10.3%	10.0%	4.6%	3.7%	5.0%	23.3%
State Totals%	33.3%	29.7%	6.6%	7.6%	8.1%	7.1%	4.1%	2.0%	1.5%	14.7%

Note: Counties in red are above 25% wildfire risk (V = very, L = low, M = moderate, H = high)

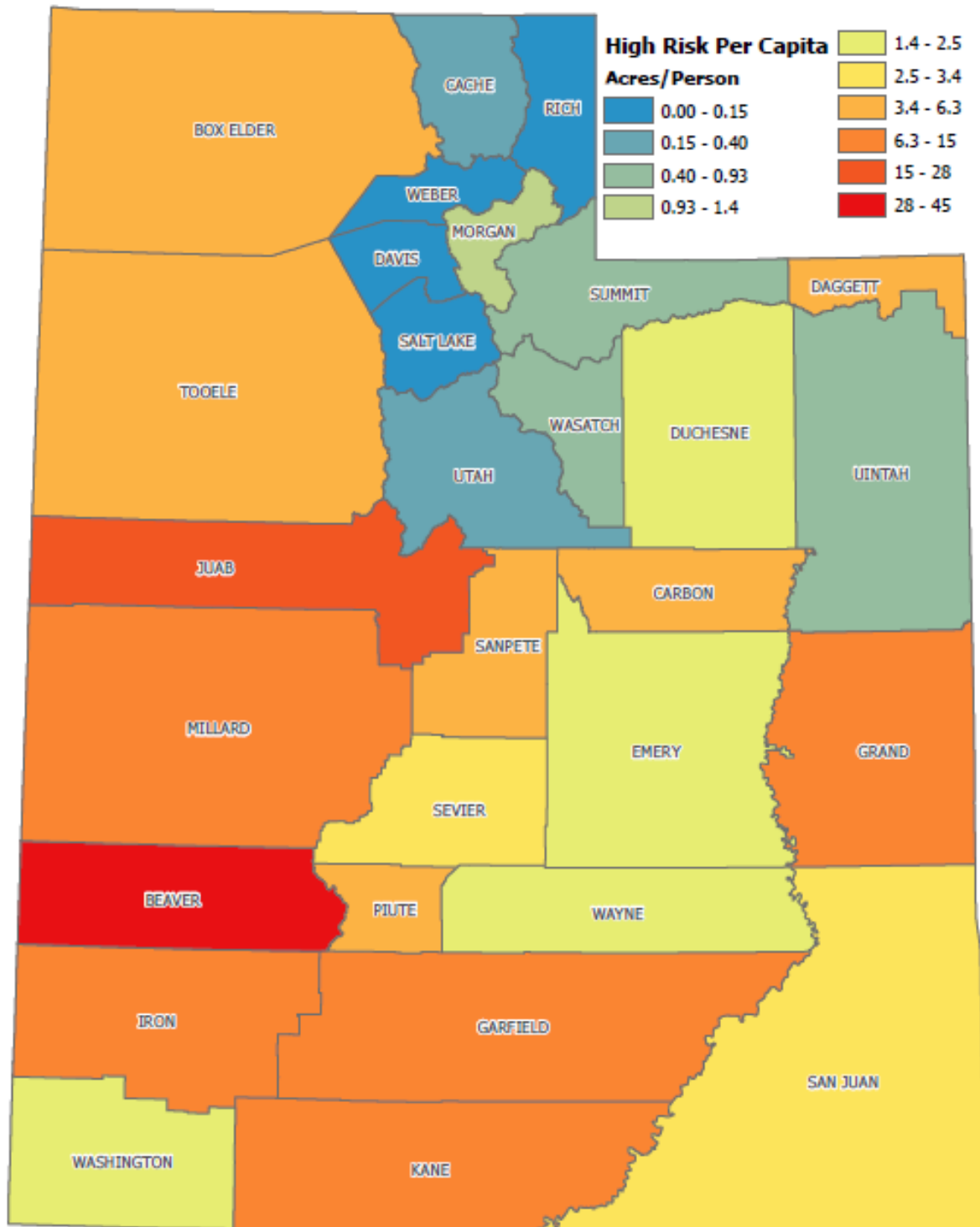
Map 10. Utah Wildfire Risk by County



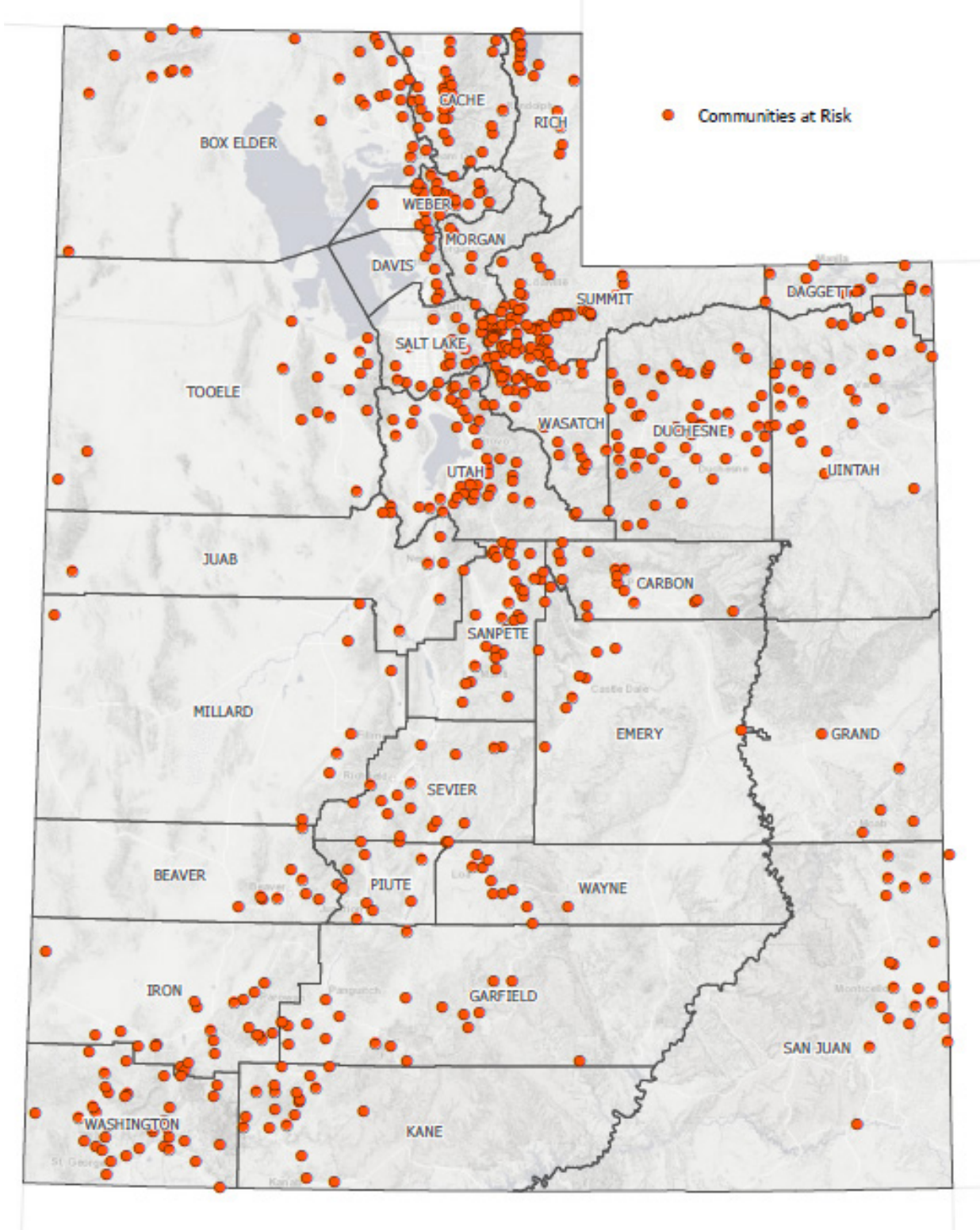
Map 11. Counties with Majority of Land in High-Risk Fire Category



Map 12. Utah Wildfire High Risk Per Capita

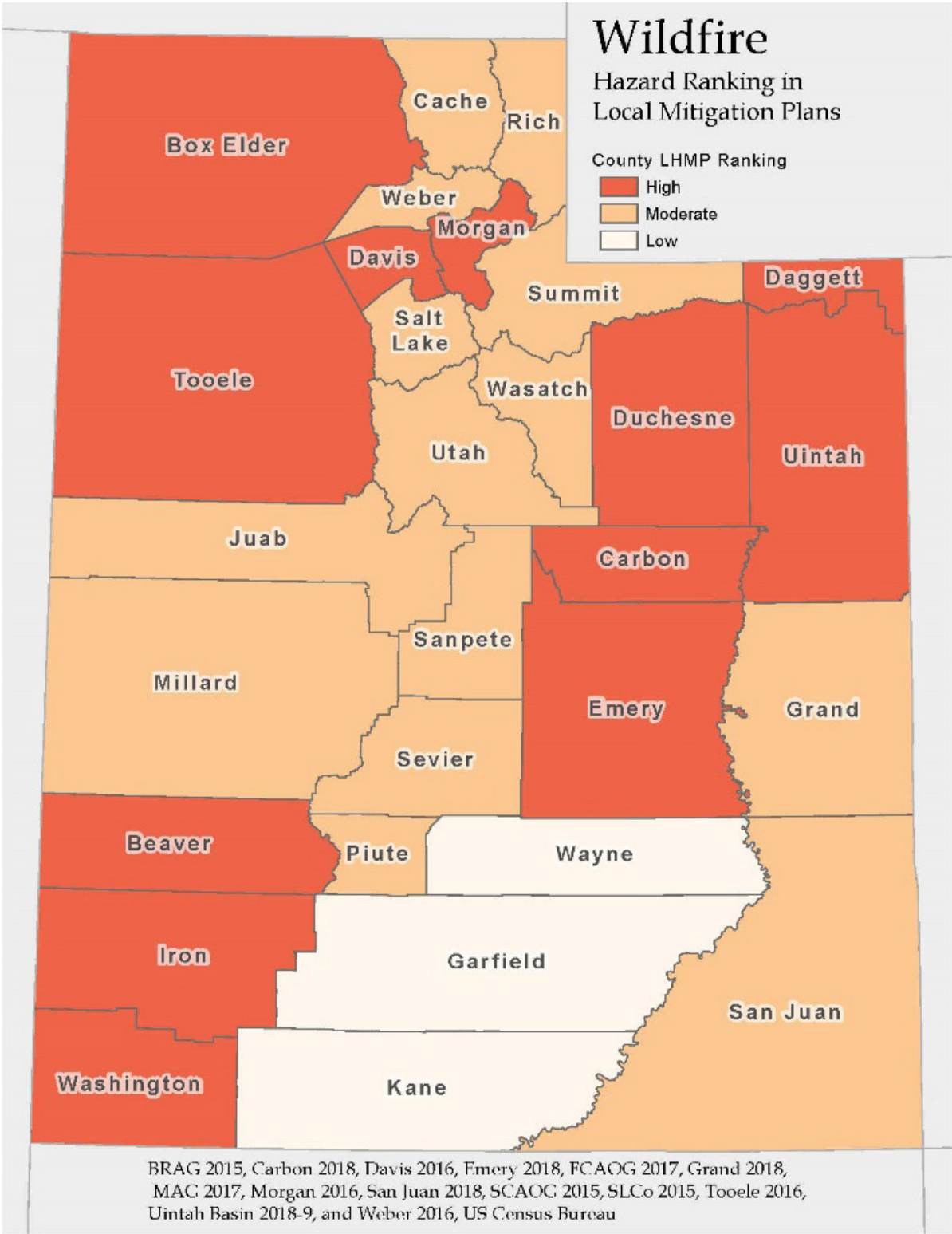


Map 13. Utah Communities at Risk from Wildfire



A map was also created that shows the hazard ranking of wildfire for each county as reported in the LHMPs (see Map 11). The hazard ranking is calculated from a combination of severity (categorized from 0-4) and frequency (categorized from 0-4). This allows for a ranking from 0-8 when combined. Based on the reporting in LHMPs, 12 counties reported that they are at high risk to wildfire and 14 counties reported they were at moderate risk.

Map 14. Wildfire Hazard Rankings from Local Hazard Mitigation Plans 2018



For the SHMP 2019 update, the SHMPC looked at the county LHMPs to gather data on the vulnerability and losses of people, residential units, commercial units, and critical facilities for each county that reported such data. Only 16 counties reported data related to wildfire in their LHMPs. The LHMPs reported over 190,000 people to be at risk to wildfires. There were over 78,174 residential units, for a total value of over \$16 billion dollars, and 7,001 commercial units, for a total value of around \$6 billion dollars that was reported to be vulnerable to dam failure. There were 330 critical facilities listed as being at risk to wildfire.

Table 5. Wildfire Vulnerability and Loss from LHMPs

County	People	Residential Units		Commercial Units		Critical Facilities
		Units	Value	Units	Value	
Beaver		1224	\$83,432,402	110	\$38,318,920	
Box Elder	15,139	4837	\$898,094,506	770	\$554,169,413	
Cache	31,825	9823	\$2,060,433,961	757	\$1,193,882,541	72
Carbon	4886	2184	\$171,743,208	153	\$262,900,000	6
Davis	10,804	4027	\$804,139,154	290	\$328,930,000	
Emery	1890	630	\$85,113,000	56	\$21,640,000	18
Garfield		608	\$74,196,098	30	\$7,710,030	
Grand	1402	712	\$886,440,00	62	\$47,120,000	11
Iron		5248	\$738,298,799	329	\$195,350,668	
Kane		1215	\$114,697,339	56	\$22,926,337	
Morgan	3575	1254	\$259,274,500	35	\$7,805,872	
Salt Lake	70,795	5424	\$1,785,312,688	419	\$1,809,855,542	
San Juan	1588	397	\$54,627,200	15	\$11,700,000	19
Tooele	46,824	14539	\$3,172,545,916	513	\$904,493,694	196
Weber	3850	3188	\$920,986,200	107	\$86,747,175	8
Washington		22,864	\$4,902,165,200	1,299	\$772,896,700	
Total	192,578	78,174	\$16,125,060,171	5001	\$6,266,446,892	330

It is recommended that growing counties follow FEMA's Firewise construction recommendations for all new development areas to minimize wildfire risk. The Firewise program encourages and assists neighborhoods to mitigate wildfire hazards. There are currently 28 Firewise communities in Utah.

Table 6. Firewise Communities in Utah

Community Name	County	Number of Residents	First Year
Alpine Acres	Summit	157	2010
Argyle Canyon	Duchesne	1100	2014
Aspen at Fish Lake	Wayne	38	2016
Aspen Hills	Sanpete	550	2015
Castle Valley	Grand	350	2004
Causey Estates	Weber	215	2016
Colony HOA at White Pine Canyon	Summit	148	2017
Diamond Hills	Wasatch	51	2010
Emigration Canyon	Salt Lake	850	2002
Fairview Lake Association	Sanpete	225	2016
Fish Lake Cabins	Sevier	206	2016
Fruitland	Duchesne	800	2010
Hi-Country Estates Phase 1	Salt Lake	88	2016
Hi-Lo/Arrowhead	Beaver	250	2014
Hideaway Valley	Sanpete	82	2016
Mountain Green	Morgan	4000	2016
Mt. Air	Salt Lake	100	2017
Redmond Town	Sevier	730	2017

Scofield Mountain Homes	Carbon	200	2016
Skyline Mountain Resort	Sanpete	625	2017
Spring City	Sanpete	1000	2016
Summit Park	Summit	719	2013
Sundance, North Fork Canyon	Utah	250	2002
Tabby Springs	Duchesne	250	2013
Town of Stockton	Tooele	614	2016
Whispering Pines	Sanpete	32	2015
Willow Glen	Sanpete	36	2015
Woodland Hills	Utah	950	2014

Map 15. Firewise Communities in Utah 2018

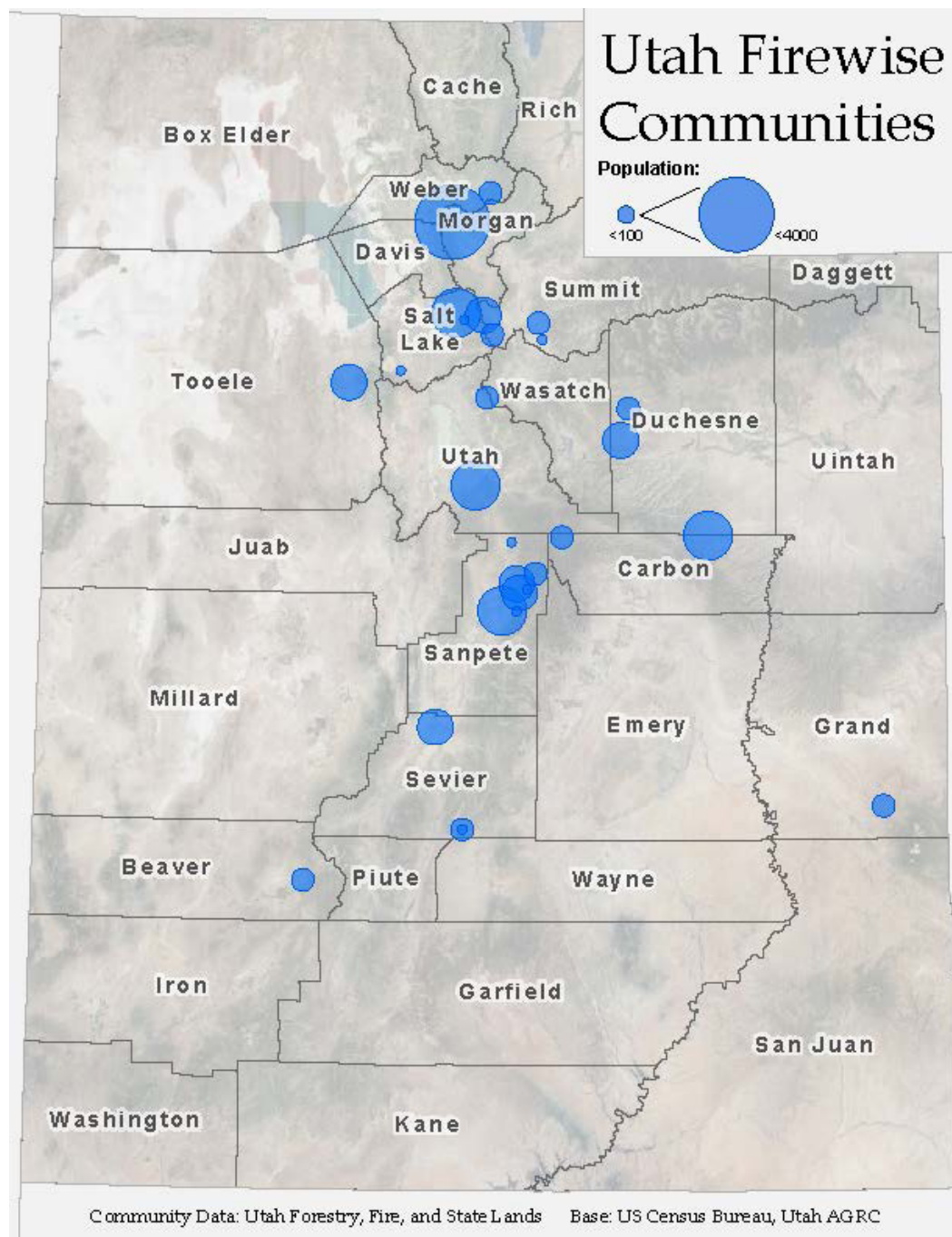


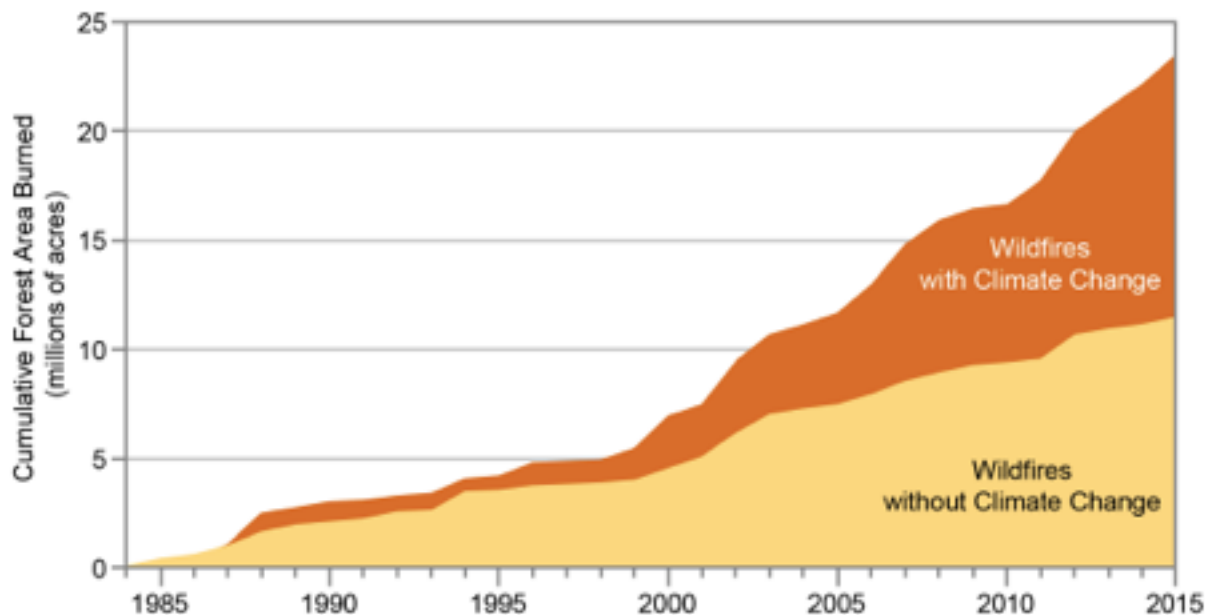
Table 7. Exposed Values by County for Wildfire

County	Residential Value	Non-Residential Value	Schools	Hospitals	Emergency Response Facilities	Total Building Value
Beaver	\$441,744,000	\$130,675,000	6	2	8	\$572,419,000
Box Elder	\$3,383,157,000	\$828,738,000	24	2	26	\$4,211,895,000
Cache	\$6,773,344,000	\$2,307,624,000	38	2	23	\$9,080,968,000
Carbon	\$1,508,943,000	\$485,995,000	9	1	16	\$1,994,938,000
Daggett	\$125,097,000	\$25,304,000	3	0	5	\$150,401,000
Davis	\$22,328,303,000	\$4,685,119,000	105	3	33	\$27,013,422,000
Duchesne	\$1,660,528,000	\$359,267,000	12	1	12	\$2,019,795,000
Emery	\$706,705,000	\$200,292,000	10	0	12	\$906,997,000
Garfield	\$571,487,000	\$218,196,000	9	1	17	\$789,683,000
Grand	\$708,879,000	\$337,444,000	4	1	16	\$1,046,323,000
Iron	\$2,884,616,000	\$942,022,000	17	1	20	\$3,826,638,000
Juab	\$664,989,000	\$259,952,000	9	1	13	\$924,941,000
Kane	\$836,847,000	\$215,752,000	9	1	19	\$1,052,599,000
Millard	\$880,869,000	\$301,399,000	10	2	17	\$1,182,268,000
Morgan	\$737,264,000	\$167,842,000	4	0	4	\$905,106,000
Piute	\$134,933,000	\$32,702,000	3	0	5	\$167,635,000
Rich	\$486,755,000	\$55,866,000	4	0	5	\$542,621,000
Salt Lake	\$74,079,664,000	\$24,604,780,000	335	16	110	\$98,684,444,000
San Juan	\$755,552,000	\$230,903,000	14	2	21	\$986,455,000
Sanpete	\$1,835,901,000	\$666,313,000	16	2	23	\$2,502,214,000
Sevier	\$1,509,720,000	\$412,897,000	12	1	14	\$1,922,617,000
Summit	\$5,693,966,000	\$1,024,772,000	18	1	19	\$6,718,738,000
Tooele	\$4,187,635,000	\$621,880,000	27	1	27	\$4,809,515,000
Uintah	\$2,293,741,000	\$540,599,000	14	1	15	\$2,834,340,000
Utah	\$30,557,508,000	\$8,197,500,000	177	8	60	\$38,755,008,000
Wasatch	\$2,344,458,000	\$389,906,000	9	1	11	\$2,734,364,000
Washington	\$10,009,325,000	\$2,231,927,000	52	2	51	\$12,241,252,000
Wayne	\$266,918,000	\$70,734,000	4	0	12	\$337,652,000
Weber	\$16,930,541,000	\$4,122,687,000	76	2	34	\$21,053,228,000

CLIMATE CHANGE IMPACT

Climate change, specifically increases in temperature, will increase the risk of wildfire occurrence in Utah. Extensive changes to both the length and severity of the fire season began around 1970 in the western United States. Burned area in the southwestern United States increased by 668% in the 1990s and by 1,266% in the 2000s. Southwestern United States fire season length increased from 82 days in the 1970s to 182 days in the 2000s, and the mean burn time of fires increased from 3 to 41 days.⁵ Changes in climate also increase fuel aridity, or dryness, through increased temperatures and vapor pressure deficit for trees. From 2000 to 2015, there was a 75% increase in fuel aridity because of climate change. The increase in fuel aridity resulted in an additional 10.4 million acres burned in the West from 1984 to 2015 (Figure 9).⁶ The trends in acres burned by wildfire in the western United States are projected to continue through the twenty-first century as temperatures warm and incidence of drought increases. The projected increase in fire risk is due to a lengthening of the fire season caused by earlier onset of spring, earlier snowmelt⁷ and reductions to seasonal snowpack.⁸

Figure 9. Cumulative forest area burned in the western United States from 1985 to 2015 with and without the effect of climate change.^{9 10}



DEVELOPMENT TRENDS IMPACT

Zones of greatest potential loss to wildfire are located in WUI areas that continue to expand with the state's growing population. Wildfire hazards ranked by population indicate that Summit, Millard and San Juan counties have the largest areas of extreme and high wildfire risk.

Data gathered from the Utah Division of Forestry, Fire, and State Lands shows that Utah's Wildland Urban Interface (WUI) consists of about 93% undeveloped WUI and 7% developed WUI. See Figure 10.

⁵ Westerling, A. L. Increasing western US forest wildfire activity: sensitivity to changes in the timing of spring. *Philos. Trans. R. Soc. B* 371, 2015078 (2016)

⁶ Gillies, R. R., Wang, S. Y. & Booth, M. R. Observational and synoptic analyses of the winter precipitation regime change over Utah. *J. Clim.* 25, 4679–4698 (2012)

⁷ Abatzoglou, J. T. & Williams, A. P. The impact of anthropogenic climate change on wildfire across western US forests. *Proc. Natl. Acad. Sci.* In press, (2016)

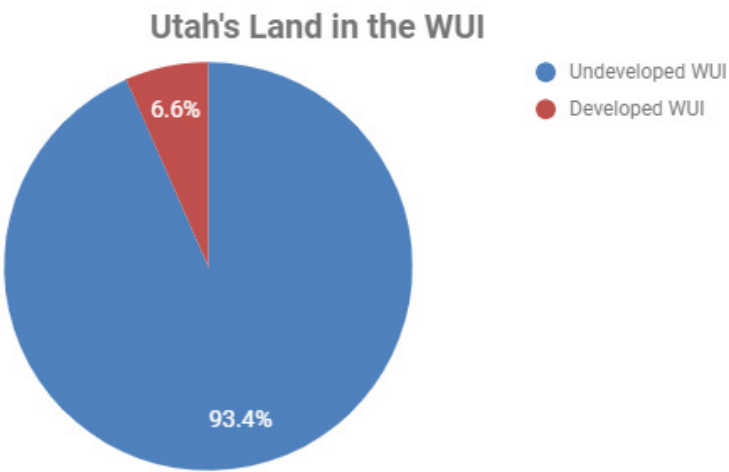
⁸ Garfin, G. M. et al. Impacts, Risks and Adaptation in the United States: Fourth National climate Assessment, Volume II: Southwest. (2018)

⁹ Abatzoglou, J. T. & Williams, A. P. The impact of anthropogenic climate change on wildfire across western US forests. *Proc. Natl. Acad. Sci.* In press, (2016)

¹⁰ Garfin, G. M. et al. Impacts, Risks and Adaptation in the United States: Fourth National climate Assessment, Volume II: Southwest. (2018)

Utahns continue to build homes in the WUI, especially on the southern end of Salt Lake County and the northern end of Utah County, where structures are at high or extreme wildfire risk. Low elevation sites are ideal for real estate development, but they often contain wildland fuels that make them prone to wildfires. In 2007, wildfires burned 600,000 acres in Utah. Herriman, Utah’s third fastest growing city saw wildfires in 2010, 2012, and 2013 that destroyed homes and caused the evacuation of local residents. In 2012, 400,000 acres were scorched including 5,502 acres in the Dump Fire along the border of Saratoga Springs and Eagle Mountain, two of the fastest growing cities in Utah. In 2013, spring rains triggered a mudslide of fire debris in that same area that damaged over 20 homes. These events illustrate how wildfire danger increases as urban sprawl expands into the WUI in Utah.

Figure 10. Utah’s Undeveloped and Developed Land in the WUI.



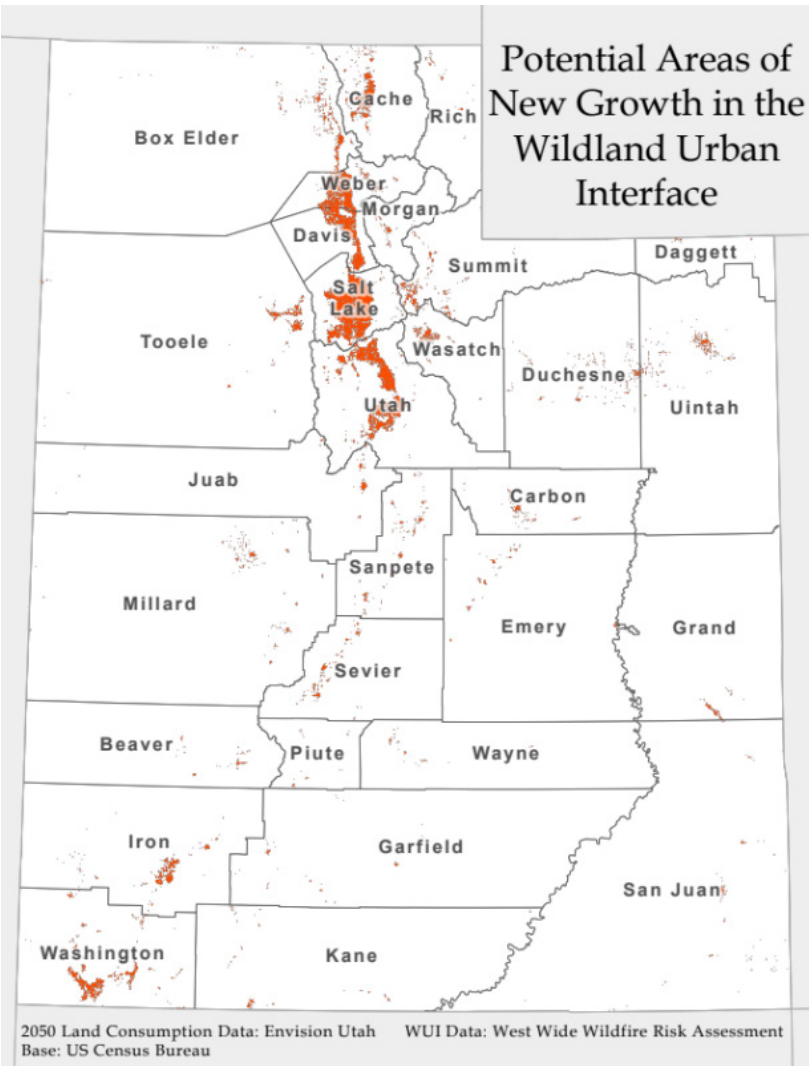
Source: Utah Division of Forestry, Fire, and State Lands, 2017

Utah continues to experience growth, so planning officials must consider wildfire potential as they build homes and structures in rural areas prone to wildfires. Counties and cities should plan for fire response in wildland areas to mitigate threats to loss of life, property and natural resources.

Table 8. Amount of land where Urban Growth intersects with WUI

Name	Land Consumption Growth 2050, sq mi	WUI within Land Consumption Growth 2050 area, sq mi
Utah	232.8	73.4
Weber	64.5	32.0
Salt Lake	98.8	28.4
Washington	103.1	25.5
Cache	38.3	18.2
Iron	38.9	16.6
Davis	31.8	15.7
Tooele	51.8	15.2
Box Elder	36.2	11.6
Wasatch	22.6	8.9
Summit	21.3	6.8
Morgan	7.7	2.7
Juab	7.3	2.5

Map 16. Potential Areas of New Growth in the WUI



11.3 Assessment of State Wildfire Vulnerability and Potential Losses

In 2012, approximate values for state-owned facilities were provided by the West Wide Wildfire Risk Assessment Project (WWA). The Oregon Department of Forestry conducted this assessment on behalf of the Council of Western State Foresters with funding from the USDA Forest Service. The WWA risk assessment process factors in the FEI and Suppression Difficulty Rating (SDR) to determine the areas and values that can be affected by wildfires and assign a Values Impacted Rating (VIR) for each asset. Assets include infrastructure, forest, riparian wetland, wildland development area (housing units per acre) and area of drinking water importance.

Current values were compiled and updated with the most recent data from several state agencies and federal entities including FFSL and FEMA. State-owned facility data was overlaid on the state wildfire risk map to create the Statewide Fire Risk Assessment available through the Utah Automated Geographic Reference Center (AGRC). ArcGIS was used to determine which state-owned facilities are within extreme, high and moderate wildfire risk areas. The current values of those 5,702 facilities within high or extreme wildfire risk areas were then summed in order to determine the total estimated current value of at-risk facilities for each county \$19 billion. In addition, the per capita loss for state facilities to wildfire risk was calculated for each county and ranked from the highest to lowest.

NUMBER OF STATE FACILITIES

Map 17. Number of State Facilities

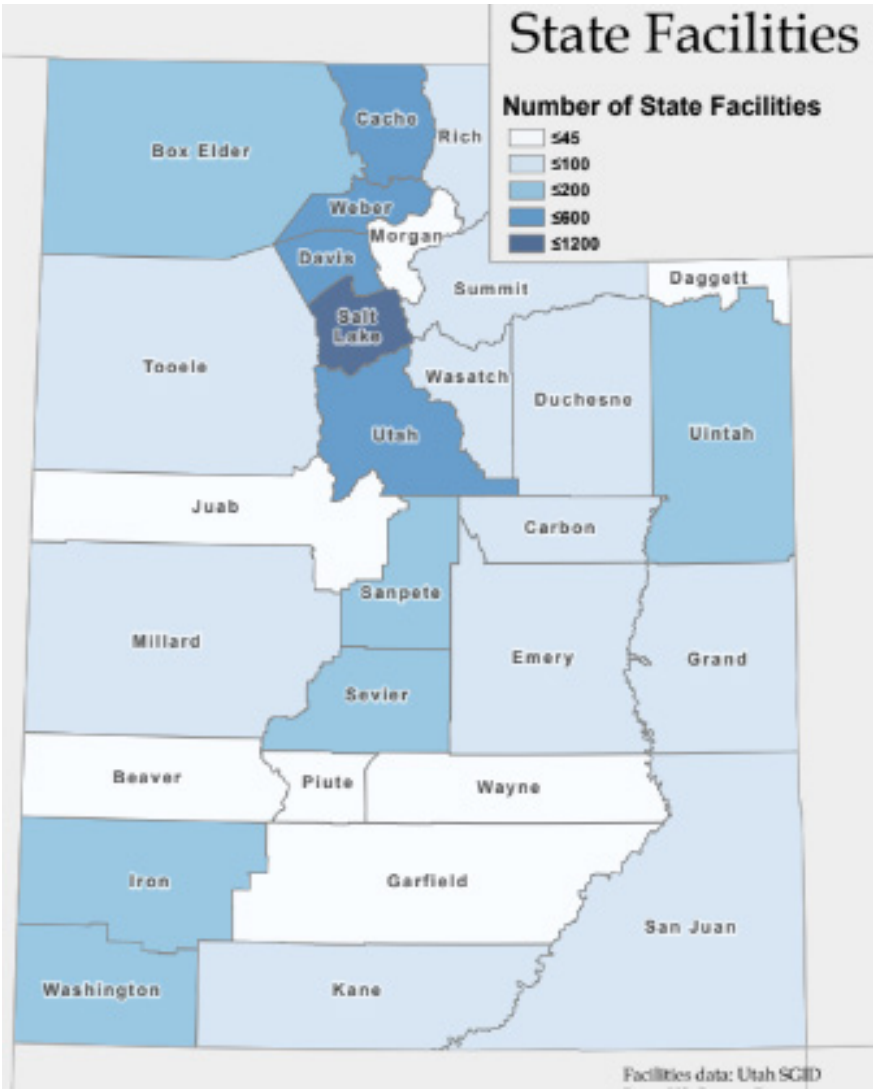


Table 9. State-owned Facilities in Wildfire Risk Areas by County

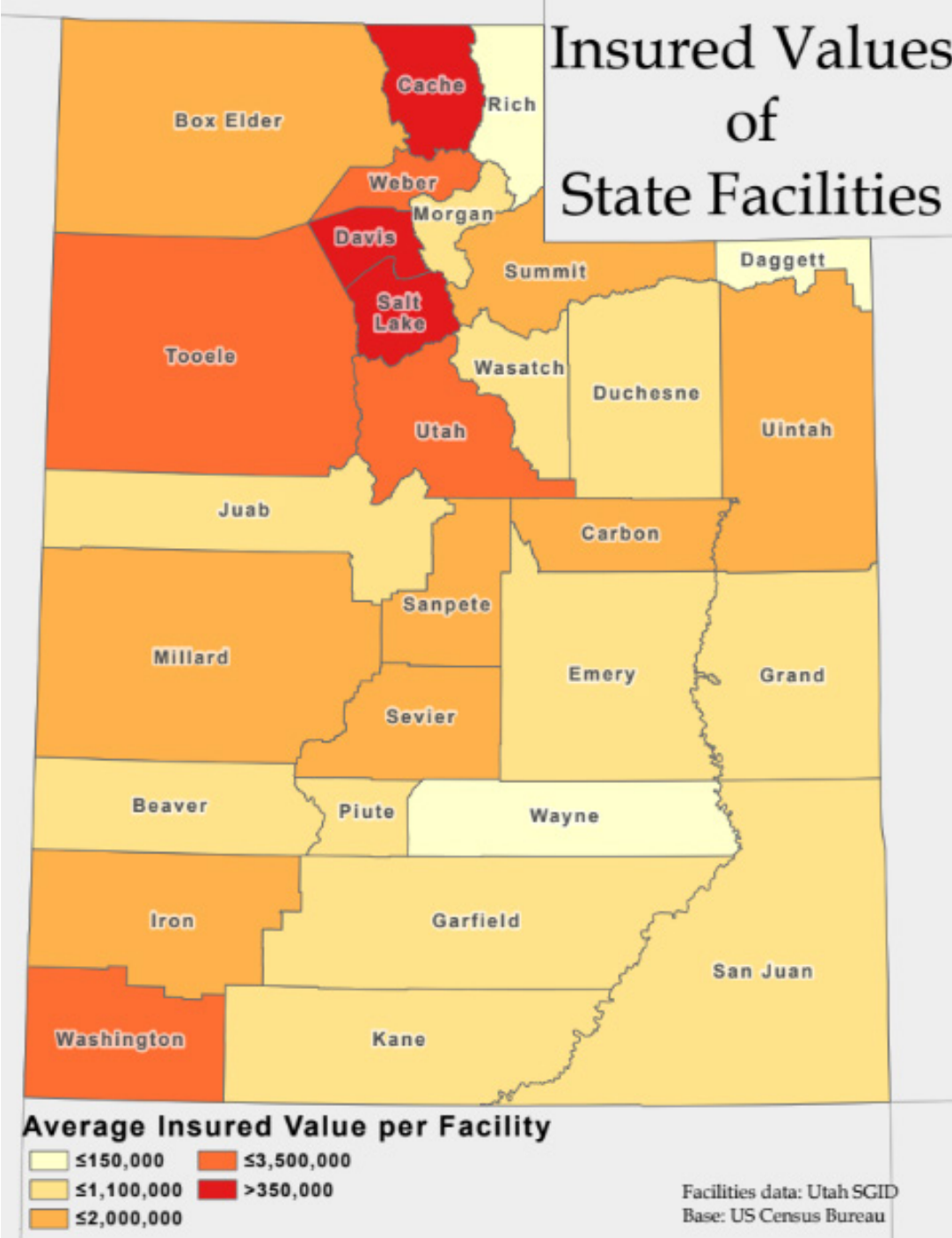
County	Extreme	Very High	High	Moderate - High	Moderate	Total
Beaver	7	0	1	0	4	12
Box Elder	5	3	12	31	18	69
Cache	31	3	7	17	26	84
Carbon	2	0	1	14	11	28
Daggett	0	8	1	0	3	12
Davis	7	10	12	7	4	40
Duchesne	0	4	2	9	6	21
Emery	0	1	0	0	5	6
Garfield	0	1	1	6	6	14
Grand	0	0	0	2	2	4
Iron	3	15	13	9	16	56
Juab	17	0	2	2	1	22
Kane	3	2	8	4	0	17
Millard	2	3	4	5	9	23
Morgan	1	4	1	8	12	26
Piute	0	0	0	1	2	3
Rich	0	0	0	0	0	0
Salt Lake	98	16	28	22	17	181
San Juan	0	0	0	9	11	20
Sanpete	16	5	0	16	7	44
Sevier	1	7	13	22	7	50
Summit	12	5	7	11	11	46
Tooele	6	0	2	4	1	13
Uintah	0	0	0	1	4	5
Utah	29	14	20	30	25	118
Wasatch	0	1	6	25	14	46
Washington	10	8	11	18	13	60
Wayne	0	0	0	2	1	3
Weber	16	2	3	12	3	36
Total	266	112	155	287	239	1,059

SOURCES: Utah Automated Geographic Reference Center (state facility data),
West Wide Wildfire Risk Assessment

State facilities located in extreme and high wildfire areas exist throughout Utah. Salt Lake, Cache, Washington, Utah, Iron and Emery Counties all have over 100 state facilities in extreme and high risk areas.

Utah’s five largest counties have projected ongoing population growth with expansion planned in wildfire risk areas. This expansion will put additional pressure on state agencies to provide fire defense services to state-owned structures like the recently constructed Utah Natural History Museum built in the foothills of Salt Lake City in the WUI.

Map 18. Insured Value of State Facilities



The top three counties, Daggett, Rich and Garfield have negative population growth projections but Washington County has a high population growth rate and will need to build new state services and facilities in the future. As more information on state-owned buildings located in extreme and high wildfire risk areas becomes available, risks will be calculated more accurately.

11.4 Mitigation Efforts for Wildfire Hazard Mitigation

PROGRESS SINCE THE 2014 SHMP

Utah switched from a reactive wildfire suppression strategy to a proactive risk reduction strategy that became effective in 2017 with the legislative adoption of a new wildland fire policy between the FFSL and participating counties, municipalities and special service fire districts throughout Utah who chose to opt in. Every participating entity is required to create a community wildfire preparedness plan (CWPP) within two years of joining the system to help prioritize risk reduction projects for their jurisdiction or community. When wildfires occur, the participating entities join with the associated fire department to mount the best possible initial attack (IA) to control and contain the fire quickly. If the wildfire escapes the IA, the participating entity can transfer the fiscal responsibility to the state. When this delegation occurs, the incident will be managed in a unified command environment and the costs associated with the fire will be paid through the state fire suppression fund. The system also emphasizes wildfire suppression red card training and certifications, annual firefighting refreshers and purchases equipment to enhance IA capabilities.

During the summer of 2012, Utah had a particularly active wildland fire season. Fires throughout the state caused considerable damage to resources, infrastructure and personal property. Following this severe fire season, Governor Gary Herbert charged state land managers with the task of developing a cooperative strategy to reduce the size, intensity and frequency of catastrophic wildfires in Utah.

Following the governor's decree, the Catastrophic Wildfire Reduction Steering Committee was convened. The committee functions under the authority of the [Utah Conservation Commission](#) and is chaired by the [Utah Division of Forestry, Fire and State Lands](#). The steering committee coordinates local, state and federal government and natural resource agencies, along with private sector stakeholders, in a joint and unified effort. The committee recommended that a significant additional investment needed to be made by the state and affected stakeholders for mitigation.

Utah lawmakers consequently authorized the initial funding of the Catastrophic Wildfire Reduction Strategy, with approximately \$2 million of state funds. The significance of the allotment cannot be overstated in that it represents the first time that state funds have been dedicated to wildfire issues not directly related to suppression costs. Specifically, the initial funding could only be utilized for implementation efforts, primarily fuels mitigation projects. Six regional working groups were established and are using a risk assessment process to evaluate and prioritize areas at risk.

The three interdependent goals of the [National Cohesive Wildfire Management Strategy](#) are at the heart of Utah's Catastrophic Wildfire Reduction Strategy effort. As the program matures, the state will improve landscape resilience through fuels mitigation and prescribed fire projects, assist and educate human populations with preparing for and withstanding fire events, and continue to provide and improve timely and effective fire suppression response.

Perhaps most importantly, with sustained funding, the time and efforts of dedicated professionals can be focused on these pressing issues. Governor Herbert has explicitly expressed his desire to limit our citizens' exposure to the cost and effects of catastrophic wildfire. The state legislature has thus authorized an initial expenditure of tax payer funds. Using those funds, land managers are now in the process of implementing a holistic approach to dealing with the challenges faced by the state.

The next tables illustrate the projects that received state funding.

Table 10. Forestry, Fire and State Lands Cat Fire Projects 2015

FFSL Area	County	Project Name	Project Type	Total Size	Funds Allocated
Central	Sanpete	Aspen Hills	Fuel Break	82 acres	\$525,000
Central	Sanpete	Bald Mountain	Fuel Break	480 acres	
Central	Sanpete	Fairview Heights	Fuel Break	841 acres	
Central	Sanpete	Hideaway Valley	Fuel Break		
Central	Sanpete	Holiday Oaks	Fuel Break		
Wasatch	Salt Lake	Hi Country Estates	Ingress/Egress	15-25 acres	\$52,000
Wasatch	Salt Lake	Suncrest	Fuel Break	45 acres	\$216,000
Wasatch	Utah	Lake Mountain	Fencing	~3.5 miles	\$6,500
Wasatch	Davis	Fruit Heights	Ingress/Egress	~ 1mile	\$20,000
Northeast	Daggett	Dutch John	Fuel Break	9 acres	\$30,000
Southeast	Grand	Willow Basin	Fuel Break & Ingress/Egress	8 acres	\$25,000
Bear River	Weber	Powder Mountain	Fuel Break & Ingress/Egress	235 acres	\$50,000
Bear River	Cache	East Bench	Fuel Break	~1mile	\$17,000
Bear River	Rich	Bridgerland	Fuel Break	33 acres	\$20,000
Bear River	Box Elder	Lower Bear River Valley	Re-treatment	76 acres	\$65,200
Bear River	Box Elder	Grouse Creek	Fuel Break	~3000ac	\$150,000
Southwest	Beaver	North Creek	Fuel Break & Defensible Space	58.5 acres	\$100,000
Southwest	Garfield	Mammoth Creek	Fuel Break	140 acres	\$150,000
Southwest	Iron	Upper Parowan Creek (Brian Head)	Fuel Break	21.2 acres	\$100,000
Southwest	Kane	Duck Creek	Defensible Space/ Fuel Break	75 acres	\$100,000
Southwest	Washington	Hwy 18 Corridor	Fuel Break & Re-treatment	260 acres	\$300,000
				Allocated Total: \$1,926,700	

Table 11. DNR Approved Catastrophic Wildfire Reduction Strategies for Counties in Utah 2016

Catastrophic Wildfire Reduction Strategy: Approved Actions FY'16					
Regional Workgroup	County	Project Name	Project Type	Total Size	Funds Allocated
Central	Sanpete	Aspen Hills	Continue fuel break and spot treatment with Herbicide	37 acres	\$448,000
Central	Sanpete	Bald Mountain	Continue fuel break and spot treatment with Herbicide	178 acres	
Central	Sanpete	Fairview Heights	Continue fuel break and spot treatment with Herbicide	75 acres	
Central	Sanpete	Hideaway Valley	Continue fuel break and spot treatment with Herbicide	392 acres	
Central	Sanpete	Holiday Oaks	Continue fuel break and spot treatment with Herbicide	150 acres	
Wasatch Front	Utah	Lake Mtn/Saratoga Springs	Expand fencing to promote fuels reduction through grazing	Fencing to incorporate 600 additional acres	\$2,500
Wasatch Front	Utah	Saratoga Springs	Update 16-year old community wildfire protection plan (CWPP)	Updated Saratoga Springs CWPP	\$5,000
Northeast	Duchesne	South Duchesne	Fuel break & fuels treatments	330 acres	\$500,000
Northeast	Daggett	Flaming Gorge Acres	Development of Flaming Gorge Acres CWPP	Completed CWPP for Flaming Gorge Acres	\$5,000
Northeast	Daggett	Dutch John	Acquire Type VI Wildland Fire Engine	Improved suppression response & capacity	\$40,000
Southeast	Grand	Willow Basin, LaSal Mtns.	Continue fuels treatments	Protect community of Willow Basin	\$80,000
Southeast	Grand	Willow Basin/ West Slope	Outfit 6k G FEPP truck & potable tank for prepositioning	County Wide?	\$7,000
Southeast	Grand	WillowBasin/ West Slope	2 - 7k gallon H2O tanks & fittings	Provide draftable water for communities	\$17,000
Southeast	Grand	Sand Flats	CWPP Development	Completed CWPP for Sand Flats	\$5,000
Bear River	Rich	Garden City	Development of Garden City CWPP	Completed CWPP for Garden City	\$5,000
Bear River	Rich	Woodruff	Plumb 200K gallon tank for fire resource use	Provide water for suppression	\$20,000
Bear River	Box Elder	Tremonton & Garland	Fuels reduction (cut/pile/chip) along Malad River in communities	els along one mile of river to protect watershed	\$30,000
Bear River	Box Elder	Grouse Creek	Continue fuels treatments	1000 acres	\$100,000
Bear River	Box Elder	Grouse Creek	Water storage Capacity	Provide water for suppression	\$50,000
Bear River	Box Elder	Grouse Creek	Communications tower assessment/installation	Improved communications/response	\$50,000
Bear River	Box Elder	Marble Hills	Fuels Treatment	60 acres	\$60,000
Southwest	Beaver	North Creek	Continue fuels treatments	30 acres	\$50,000
Southwest	Garfield	Mammoth Creek	Continue fuels treatments	75 acres	\$150,000
Southwest	Iron	Brian Head	Complete fuel break	50 acres	\$100,000
Southwest	Kane	Duck Creek	Continue fuels treatments	50 acres	\$100,000
Southwest	Washington	Hwy 18 Corridor	Continue fuels treatments postponed by previous funds transfer	100 acres	\$150,000
Southwest	Washington	Hwy 18 Corridor	Initiate & expand use of grazing in hwy 18 proj. area. Fencing assistance	TBD	\$30,000
Statewide Strategy Support:					
Wildfire Risk Assessment Completion			Finalize programming and first-year hosting		
Statewide Wildfire Prevention Campaign			Geographically targeted, multi-media public outreach designed to reduce human-caused wildfire ignitions		

Table 12. DNR Approved Catastrophic Wildfire Reduction Strategies for Counties in Utah 2017

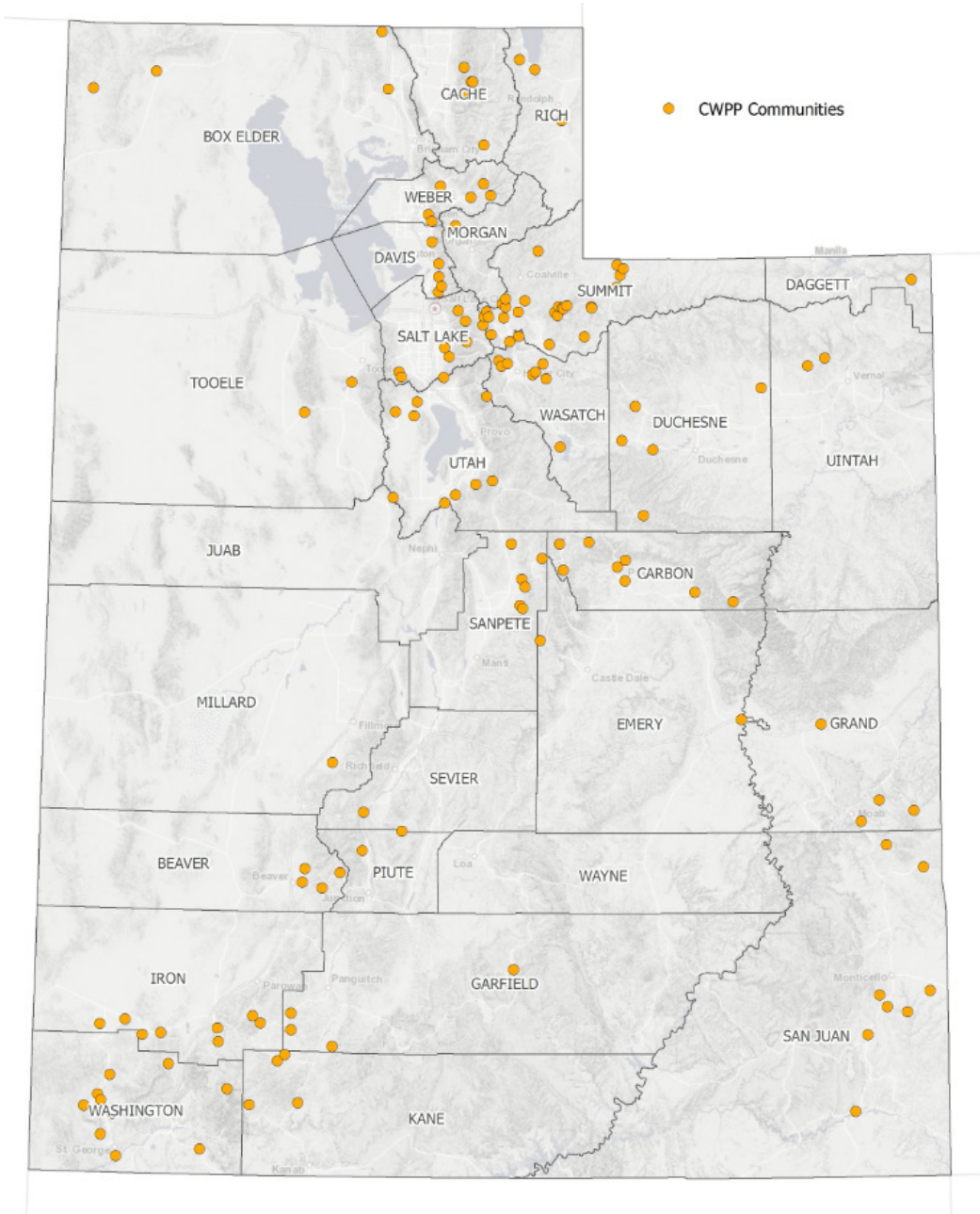
Catastrophic Wildfire Reduction Strategy: Approved Actions FY'17					
Regional Workgroup	County	Project Name	Project Type	Total Size	Funds Allocated
Central	Sanpete	Fairview Heights Fuel Reduction	Fuels Mitigation: Thinning by chaining and mastication	350 acres	\$135,396
Central	Juab	Juab County Fuel Reduction	Fuels Mitigation: Thinning by mowing and bullhog	50 acres	\$40,500
Wasatch Front	Tooele	Grantsville Grazing Association	Fuels Mitigation: Thinning by lop/scatter and bullhog	165 acres	\$52,000
Northeast	Summit	Big Canyon & Blue Sky	Fuel Mitigation: Thinning by mechanical treatment	5 acres	\$10,200
Northeast	Summit	Spring Canyon/Elkhorn Canyon	Fuel Mitigation: Thinning by mechanical treatment	10 acres	\$44,000
Southeast	Carbon	Lower Fish Creek	Fuel Mitigation: Thinning by mechanical treatment	125 acres	\$289,675
Bear River	Rich	Bear Lake WUI	Fuels Mitigation: Thinning by mowing	317 acres	\$140,000
Southwest	Beaver	Little Res. II	Fuel Mitigation: Thinning by mechanical treatment	112 acres	\$175,000
Southwest	Area Wide	5 County Planner	Planner: Community Wildfire Preparedness Plans	8 CWPPs	\$75,000

Table 13. DNR Approved Catastrophic Wildfire Reduction Strategies for Counties in Utah 2018

Catastrophic Wildfire Reduction Strategy: Approved Actions FY'18					
Region	County	Project Name	Project Type	Total Size	Funds Allocated
Central	Millard	South Fillmore Fuel Reduction	Fuels Mitigation: Fuel break with lop and scatter or prescribed burning	604 acres	\$80,000
Central	Sanpete	Sanpete East Bench Fuel Reduction	Fuels Mitigation: Fuel break with mastication	330 acres	\$50,000
Wasatch Front	Davis	Fruit Heights Fuel Reduction	Fuels Mitigation: Fuel break with cut/pile/chip and road grader	9 acres	\$38,000
Wasatch Front	Salt Lake	HI Country I & II Community Fuel Reduction	Fuels Mitigation: Community chipping	7 acres	\$37,500
Wasatch Front	Salt Lake	Camp Williams Fuels	Fuels Mitigation: Herbicide application	215 acres	\$75,000
Wasatch Front	Salt Lake	Mt. Aire Community Fuel Reduction	Fuels Mitigation: Fuel break with cut/pile/chip	40 acres	\$67,720
Southeast	San Juan	Abajo Peak Communications Fuel Reduction	Fuels Mitigation: Fuel break with cut/pile/chip	17 acres	\$9,000
Bear River	Box Elder	BoxElder Co. Fuel Treatment Inventory	Monitoring and data collection		\$100,000
Southwest	Washington	HWY 18 - Brookside & Central HFR	Fuels Mitigation: Thinning by cut/pile/chip and mastication	150 acres	\$175,000
Southwest	Kane	East Zion/North Fork Rd.	Fuels Mitigation: Thinning by cut/pile/chip	80 acres	\$62,000
Southwest	Iron	Cedar Highlands Fuel Reduction & CWPP	Fuels Mitigation: Thinning by cut/pile/burning and mechanical	160 acres	\$300,000

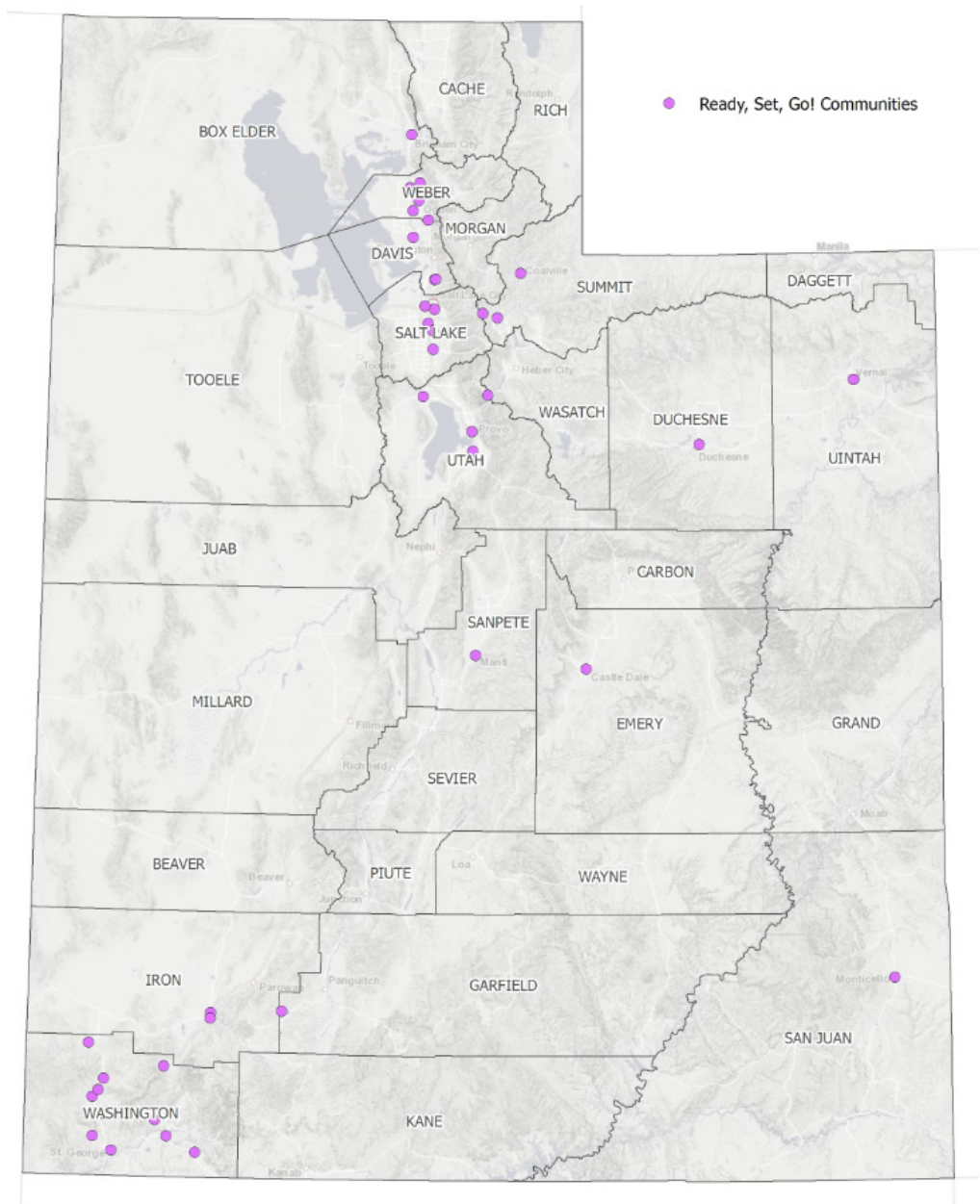
Several of Utah’s 29 counties and municipalities have adopted CWPPs. Some of these communities conduct wildfire education and outreach and partner to work on fuel reduction mitigation efforts and to implement Firewise landscaping best practices into open space re-vegetation projects. Vegetation enhances community attractiveness, reduces home cooling costs and air pollution and effectively reduces fire fuel vegetation in the WUI, which is essential to maintaining sustainable communities in high wildfire risk areas.

Map 19. Utah CWPP Communities



The Ready, Set, Go! (RSG) Program managed by the International Association of Fire Chiefs (IAFC) launched in 2011 to help fire departments educate residents in high risk wildfire areas to prepare their properties to mitigate fire hazards. The initiative is a personal wildland fire action guide for residents that correlates to the state’s Firewise Communities Program and other wildland fire public education efforts.

Map 20. Utah Ready, Set, Go! Communities



LEGISLATION AND REGULATIONS

Catastrophic fires causes economic, social and ecological harm leading to significant damage and financial impact for the state and its citizens. Utah's 2007 Milford Flat Fire was considered catastrophic, burning 363,052 acres, taxing Utah's firefighters and resources and seriously impacting Utah's air quality for six weeks. To address growing numbers of catastrophic wildfires in Utah, the state legislature passed SB 122 in 2016, modifying wildfire management agreements for the state. The law requires cities to abate uncontrolled wildfires on private or municipality-owned land within its boundaries. Cities, counties and special districts that enter into cooperative agreements with the FFSL are eligible for reimbursement for catastrophic wildland fire suppression. The 2012 steering committee recommended Utah establish a major on-going source of funding for large-scale initiatives to suppress and prevent catastrophic wildfires. The passage of SB 212 modified the state's current Wildland Fire Suppression Fund by creating a funding source and appropriating \$2 million. Municipalities that don't partner with the FFSL are responsible for their own wildland fire suppression costs within their jurisdictional boundaries, so there is a financial incentive to join the system.

Utah's adoption of a Wildland Fire Policy shift from fire suppression to risk reduction focuses on prevention, preparedness and mitigation to reduce the frequency, size and intensity of wildfires over time. By implementing best practices that have been successful in other states, FFSL is working with Utah municipalities to be fire adapted. City planning, zoning laws, development codes, prescribed burns, building retrofitting projects, vegetation management, defensible space, fuel reduction projects and outreach programs are all ongoing efforts to mitigate wildfire hazards in Utah.

To better address and mitigate wildfire risk in WUI areas, cities throughout Utah have implemented fire safe practices including building code standards, a brush management program and a public awareness campaign. Good defensible space allows firefighters to protect and save buildings or structures safely without unacceptable risk to their lives. Fuel reduction through vegetation management coupled with ignition-resistant construction and loss avoidance planning are key. Local jurisdictions are incentivized to identify high fire hazard severity zones within the area where the jurisdiction is responsible for fire protection. These zones have been plotted on a fire hazard statewide severity map so local officials can tailor mitigation measures like vegetation management landscape regulations and building standards designed to minimize loss of life, resources and property.

WILDFIRE PROTECTION RESPONSIBILITY IN UTAH

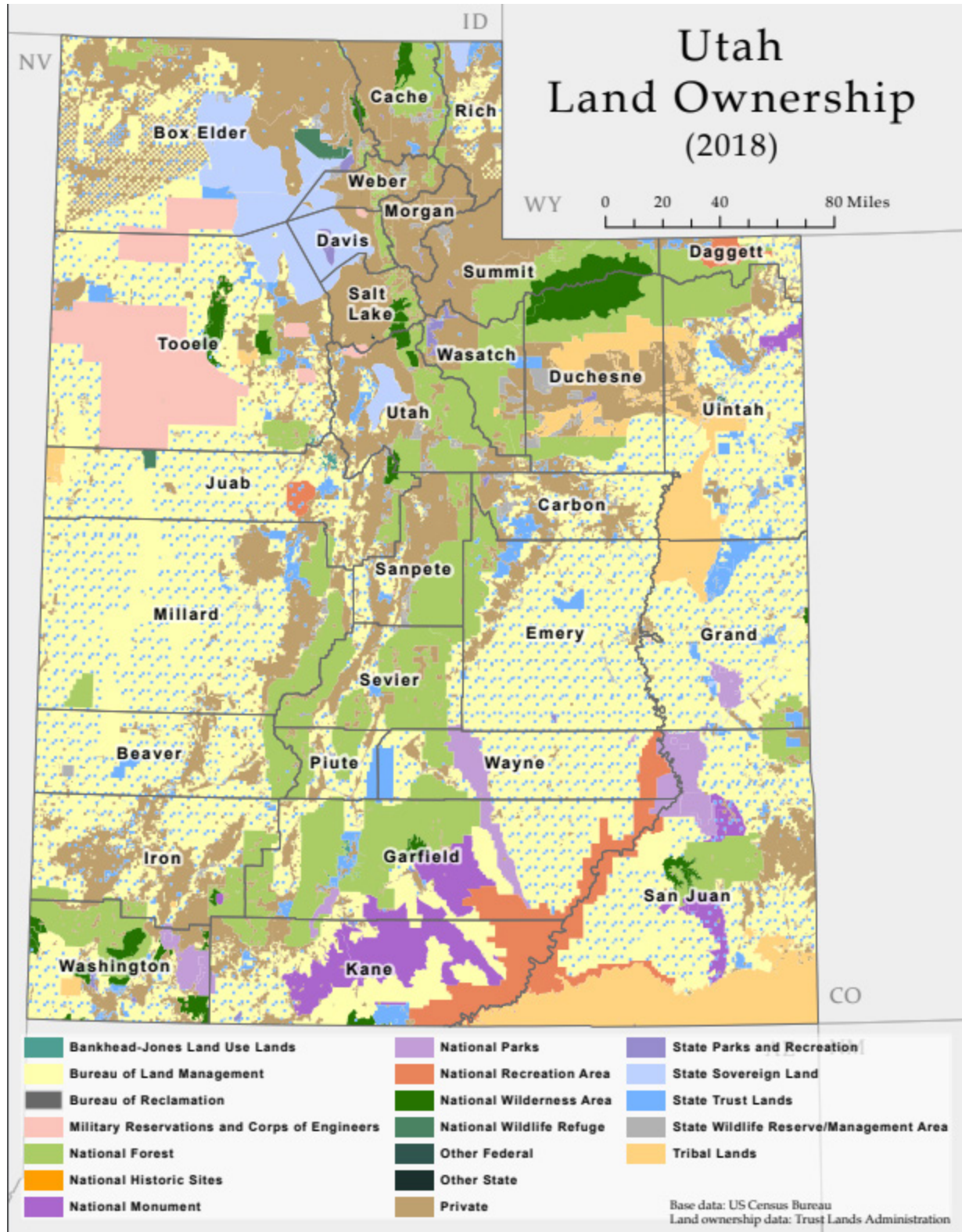
Local, state, tribal and federal jurisdictions have legal rule-making authority and financial obligation for wildland fire protection. Some responsibility is shared or dual with one agency accountable for the land and another for the structures. Wildland fire protection is expensive, especially in WUI areas.

Federal Responsibility Areas (FRAs) are fire-prone wildfire areas owned or managed by a federal agency like the U.S. Forest Service, National Park Service, Bureau of Land Management, U.S. Fish & Wildlife Service, or U.S. Department of Defense. On these parcels of land primary financial and rule-making jurisdictional authority is held by the federal land agency, but they are often interspersed with private land ownership or leases. Fire protection for developed private property is not the responsibility of the federal land management agency; structural protection responsibility rests on the local government agency or fire protection district.

State Responsibility Areas (SRAs) are parcels of land in Utah where the state has primary fire protection responsibility including setting fire code regulations for structures built on the land and assuming financial responsibility for fire protection of the area. They include (1) unincorporated areas, (2) not federally owned, (3) that have wildland vegetation cover rather than agricultural or ornamental plants, (4) have watershed and/or range/forage value, and (5) have housing densities not exceeding three units per acre. Responsibility for fire protection of development and structures on SRA land resides with the local government agency.

Local Responsibility Areas (LRAs) include land within incorporated cities, cultivated agricultural lands, non-flammable areas in unincorporated areas and those lands that do not meet the criteria for SRA or FRA. Local fire departments, fire protection districts and counties are responsible for the protection of the land in these areas.

Map 21. Utah Land Ownership



WILDFIRE HAZARD MITIGATION PLANS AND PROGRAMS

Utah is a large and diverse state with different regions requiring unique catastrophic wildfire reduction strategies and solutions that take into consideration location, situation and scale. State law requires all cities and counties to adopt general plans outlining land use, housing, circulation, conservation, open space, noise and safety. Since 1974 fire safe planning has been a requirement of all general plans in an effort to reduce potential risk of death, injury, property damage and economic and social dislocation resulting from fires. Local jurisdictions must address fire-safety standards including evacuation routes, water supplies, road widths and clearance around structures. Fire Hazard Planning encourages a collaborative approach to hazard mitigation preparation linking local mitigation efforts to land use decision-making involving state and local government agencies, elected officials, local planners, community members, nonprofit organizations, fire districts, etc. This approach is designed to maximize community safety and link planning and funding decisions.

Fires that occur on federal and tribal lands in Utah are managed by the US Forest Service, Bureau of Land Management, National Park Service, US Fish & Wildlife Service, and the Bureau of Indian Affairs. Wildfires that occur on state and private lands outside city limits are managed by the FFSL and fire suppression efforts are coordinated through county fire wardens who work with federal agencies and local fire departments. The first priority is to protect human life, second to preserve property and third to maintain natural resources.

The FFSL has established a Lone Peak Conservation Center that employs hot shot, initial attack, fuel, and engine crews trained to extinguish fires in difficult terrain across the state in Utah. They are part of a national resource sharing network able to provide assistance to neighboring states when in-state fire activity is reduced and to request help when local resources are exhausted.



Utah Lone Peak Hotshots 2006

After the 2012 severe fire season Governor Gary Herbert charged Commissioner of Agriculture Leonard Blackham with the task of developing a cooperative strategy to reduce the size, intensity and frequency of catastrophic wildland fires in Utah. A Catastrophic Wildfire Reduction Steering Committee was created to study Utah wildfires. The Utah Conservation Commission has oversight and the Division of Forestry, Fire and State Lands (DFFS) chairs and staffs the committee.

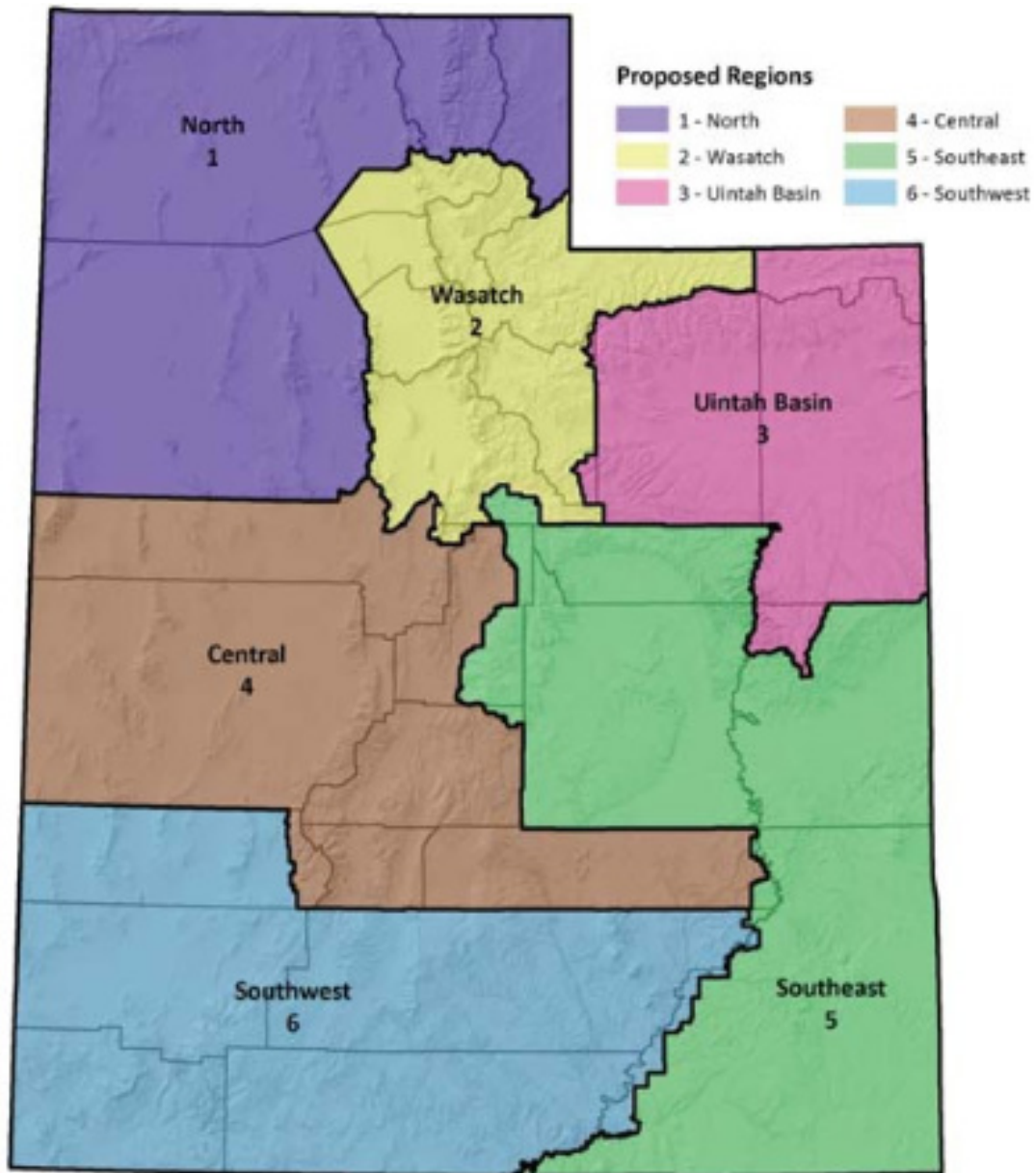
The 15 member Catastrophic Wildfire Reduction Steering Committee reviewed state statistics and confirmed Utah wildfires have become an increasingly significant problem since 1985, impacting state and local economies, infrastructure, the environment and private landowners.

The steering committee's ongoing task is to coordinate local, state and federal government, natural resource agencies, and private sector stakeholders, including non-traditional land management entities and stakeholders like agricultural, recreation and environmental communities. Regional committees have also been established to provide leadership and outreach to Utah citizens and interest groups and help communities become better insulated from wildfire risk by improving landscape health and increasing a community's resiliency following a wildfire. Regional working groups identify communities at risk and barriers to reducing catastrophic wildfire and then map their findings. This information is used to achieve a threefold goal to (1) create landscapes resilient to fire-related disturbances, (2) ensure human populations and infrastructure can withstand a wildfire without loss of life and property and (3) to help all participating jurisdictions make and implement safe, effective and efficient risk-based wildfire management decisions. This approach is compatible with the National Cohesive Wildfire Management Strategy and the Western Regional Action Plan.

In Blackham's report to Governor Herbert, he attributed the state's increased wildfires to the poor condition and ecological health of Utah range and forest lands due to "invasive species, lack of setback in plant succession, disease and climate change."¹¹ According to the United States Forest Service (USFS), Utah saves \$17 in suppression costs for every dollar spent on prevention measures. The steering committee divided the state into six regions and recommended a new monetary source be created to fund fire suppression, mitigation and prevention projects in Utah.

Fourteen pilot projects were identified statewide totaling nearly \$130 million.

¹¹ <https://ag.utah.gov/documents/CatFireFinalReport120213.pdf>



Source: Catastrophic Wildfire Reduction Strategy, <https://ag.utah.gov/documents/CatFireFinalReport120213.pdf>

Figure 11. Utah Wildfire Mitigation Pilot Projects by Region

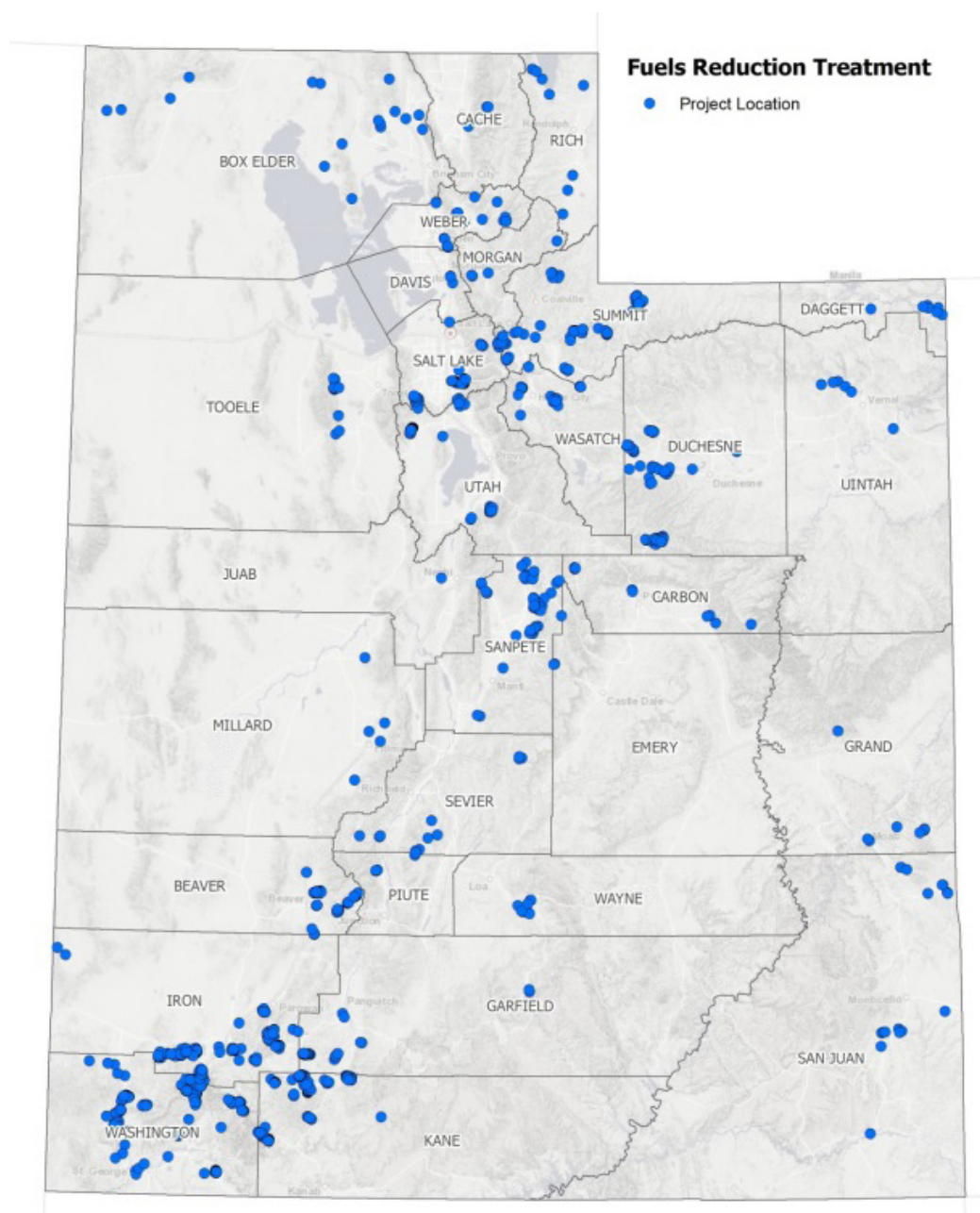
Region	Projects	Protects	Cost
1 - NW	2	forest/homes	\$ 5,600,000
2 - Wasatch	1	homes	\$ 670,000
3 - Uintah	1	homes	\$ 940,000
4 - Central	3	homes	\$ 775,000
5 - SE	2	homes/watershed	\$ 1,194,000
6 - SW	5	homes/watershed	\$120,200,000
Total	14		\$129,379,000

Source: Catastrophic Wildfire Reduction Strategy

These projects are the first steps in a decades-long process to reverse the degradation of Utah's forests and rangelands. The steering committee had seven recommendations. (1) Statewide coordination of mitigation resources, (2) establish a major on-going source of funding for large-scale initiatives to suppress and prevent catastrophic wildfires and replace aging firefighting aviation resources, (3) create regional working groups to assess and prioritize needs statewide, (4) form technical committees to respond to specific concerns of statewide importance, (5) adopt recommendations from the National Cohesive Wildland Fire Management Strategy, (6) increase public understanding and participation, (7) have the central steering committee report annually to the governor and legislature on the actions planned and taken to ensure progress is being made and the state is moving closer to the desired outcome. The steering committee proposed the state incentivize local municipalities to restructure their Local Hazard Mitigation Plans (LHMP's) to align with the SHMP by focusing on prevention and preparedness to foster Utah's wildfire mitigation progress.

Since 2012, several high wildfire risk locations across Utah have undergone fuel reduction treatments to reduce wildfire danger.

Map 23. Fuels Reduction Treatment Locations in Utah



Utah's Department of Agriculture and Food has a Grazing Improvement Plan (GIP) utilizing livestock to reduce fine fuel loads and an Invasive Species Mitigation Fund to control invasive species and reduce catastrophic fires. Livestock grazing can be a valuable tool in reducing wildfire risk and creating an ideal seedbed for fire resistant vegetation at no cost to taxpayers. Fireshed threats can also be reduced by improving landscapes in Utah.

STRATEGIC FIRE PLAN AND WILDLAND FIRE SUPPRESSION

Utah's Catastrophic Wildfire Reduction Strategy was adopted by the state legislatures and signed into law by Governor Herbert in 2016. The vision, goals and objectives are to suppress wildland fires by improving wildfire response across all jurisdictions, restore and maintain landscapes, and develop fire-adapted communities where human population and infrastructure can withstand wildfire without loss of life and property. The creation of Catastrophic Fire Reduction Fund in Utah leveraged with funds from other federal, state and local programs as well as the private sector are helping fund 14 wildfire mitigation projects across all six regions of Utah.

Regionally Significant Projects

Northern Region 1

The Bear Lake Area Project focuses on the communities around Bear Lake where a large number of homes are constructed in the wildland urban interface and need road improvements so firetrucks can access properties and residents have alternative escape routes in the event of a wildfire. Fuel reduction work also needs to be done to reduce crown fire threats to neighborhoods and aging firefighting equipment needs to be upgraded. Water availability through the Bear Lake watershed needs to be improved so fire suppression capabilities are increased and homeowners need to be educated about what they can do to mitigate wildfire risks on their own properties. The estimated cost of this project is \$3.2 million.

The Grouse Creek Project area is in a remote part of Utah with ranching interests. It has been the epicenter of several large fires over 100,000 acres in the past which threaten sage grouse habitats. Mitigation strategies include an acceleration of the fuels projects in the area removing pinyon-juniper encroaching on areas that have historically just been sage-brush and green strip firebreaks to limit the size of area wildfires. Planners also want to stage firefighting resources closer to the area, the estimated cost of this project is \$2.4 million.

Wasatch Region 2

The Midway Fuel Break Project would create a 80 foot wide 7.5 mile fuel break through gamble oak trees above the communities of Swiss Mountain Estates, Oak Haven and Interlaken developments in Midway. There would be inspection, education, compliance and maintenance costs annually bringing the estimated cost of the project to \$670,000 for 20 years.

Uintah Basin 3

The Uintah Basin Project includes two CWPPs for the Dutch John, Flaming Gorge acres, and Flaming Gorge pines areas, the acquisition of two five-ton fire trucks, and 650 acres of fuel reduction work in the national recreation area designed to protect 145 homes, 11 businesses, Flaming Gorge Dam, Highway 191, the Flaming Gorge recreation area and numerous utilities. The estimated total cost including 20 years of maintenance of fuel treatment areas is \$940,000.

Central Region 4

Three pilot projects are proposed along the Sanpete Front with extensive wildland/urban interface threatening 2,133 homes. The fuel reduction and fire breaks on non-federal lands are designed to protect human life and have an estimated total cost of \$775,000.

Southeast Region 5

The Carbon County Pilot Project involves two parcels of land in Lower Fish Creek that the county wants to secure because if they catch fire, they could cause significant damage to watershed, transportation corridors, and communication infrastructure. The creek connects to Scofield Reservoir, the sole source of drinking and irrigation water for three-fourths of the county including Helper, Price, Wellington, Spring Glen, Kenilworth, Carbonville, Miller Creek, and Coal Creek. Estimated total cost of the project is \$841,000.

The Grand County Pilot Project is designed to mitigate catastrophic fire risk above Moab and Castle Valley with fuel treatment around existing mountain communities, protection of two key communication sites, clearing along a vital power line, installation of water tanks in the Willow Basin community and completion of a CWPP for the west slope of the La Sal Mountains. Estimated project costs are \$353,000.

Southwest Region 6

One community in each county was selected to mitigate risks to become a fire adapted community at an estimated total project cost of \$120,220,000.

Washington County selected the Highway 18 corridor including the communities of Diamond Valley, Dammeron Valley, Veyo, Brookside and Central for a total of 34,843 acres treated at an estimated cost of \$54.3 million.

Iron County selected Brian Head and 8,875 acres treated at an estimated cost of \$14.7 million.

Beaver County selected the North Creek community and 55,000 acres to treat at an estimated cost of \$20 million.

Garfield County selected the Mammoth Creek community and 41,000 acres to treat at an estimated cost of \$29.7 million.

Kane County selected the Duck Creek community and 28,673 acres of private land to be treated at an estimated cost of \$1.5 million, with the intent of adding national forest lands later.